Telephone Engineer

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Check Up in Depreciation Allowance

One of the most valuable works performed by the accounting division of the United States Independent Telephone Association was the adoption of a set of units to be used in accounting the retirement of plant. The handbooks prepared by the division not only gave these units but set up a method of reporting and accounting which would insure the proper credits to plant and charges to reserve upon retirement of a plant unit.

Many companies adopted this system or modified their practices to conform to it after the system was worked out by the division. Some of these companies have been working under the system for sufficiently long time to observe some of its results in their accounts.

In very many cases, the adoption of the system resulted in larger credits to plant and greater charges to depreciation reserve than had previously been made. Few companies operating under the system were longer troubled with a mounting depreciation reserve apparently in excess of requirements. In fact, many companies have found that the annual appropriation to the reserve scarcely more than met the annual retirements.

Assuming that the system is properly applied and that only a normal amount of replacement work is being done in a growing plant, such a situation would seem to indicate that the annual appropriation to depreciation is too small to provide an adequate reserve. Where such a situation exists, the adequacy of the depreciation appropriation should be called into question rather than the merit of the system of accounting retirements.

Program Service Needs Careful Study

At the meeting of the American Program Service Association in Chicago a few weeks ago, there was much discussion of the proposal to enact legislation to prevent the interception and redistribution of programs broadcast from radio telephone stations. While at this time there seems little possibility of action by Congress in the jam at the end of the present session, it is a matter which will undoubtedly be brought up again in later sessions.

The distribution of programs over wires to the loud speaker in the home is still in its infancy and the possibilities are yet untried.. While it is working in many places, it is far from being developed on a national basis. In its development, it would be unfortunate if the same careless, everybody-for-himself method is followed, as was the case in radio broadcasting. It would be more than unfortunate if it is strangled by ill-considered legislation so soon after its birth.

There is even now a large question if the program service companies should look exclusively to the radio stations for the programs which they wish to use. Chain broadcasting has reached the point where many points on the dial of a receiving set yield the same program. There would be no greater technical difficulties in the way of providing chain programs with complete wire service than there is for broadcasting chain programs. No one who has ever compared the reproduction of a chain program picked up directly from the long distance wires with the same program picked up after being broadcast by a radio station will ever question the superiority of the all-wire transmission.

What program service needs at the present time is a careful study from a national standpoint. Hasty legislation to satisfy interests that have their own selfish ends in mind may in the end serve as a handicap to the development of a service that will ultimately become one of national utility.

We See an Unfinished Job

Once or twice each year, it falls to our lot to travel along a certain highway. At a certain point along this highway, some three or four years ago we noted that several new poles were set to replace others at a bad place in a telephone line. Some of the cross arms were placed on the new poles and the wires transferred from the old poles which were still in place waiting to be removed. Others of the new poles were still without

cross arms and the old poles were carrying the wires.

During recent weeks our path again led past this place and we saw the situation just as it was when we first noted the start of rebuilding. Some of the new poles had cross arms on them and some did not. Some of the old poles were stripped and ready for removal, while others were still carrying the wires. The wires themselves were partly transferred and were lying on the cross arms without insulators and without the slack pulled. In fact, the appearance of the job indicated that nothing had been done to finish it since it was left several years ago.

Our estimate would be that the job could be finished in two or three days' time by a small gang, but for some reason it seems that the time has never been found to do it.. It is just another of those jobs that have been started and never finished.

Every telephone plant may have some of these unfinished jobs but not all of them are as apparent as the one we have been observing. Many times they are due to a fixed habit of starting a new job before the old one is quite done, with the expectation that time will be found to finish the old job as the new one progresses. Seldom is the time found and the job remains in the unfinished condition until a line failure or further trouble requires the work to be done.

In the meantime, service is bound to suffer to some degree and the plant with many of these unfinished jobs can, in no manner, keep its service up to the same point of efficiency as the plant in which work is done properly, and once having been begun is carried on to its completion with a minimum of delay. Such unfinished jobs have no place in a well managed telephone plant.

The Bell Annual Report

Comment on the Bell System annual report which is released for publication about March 1, each year, usually takes the form of discussion of financial results of the year's operations. While telephone men are interested in the financial statements of the industry's largest system, yet to them there is also great interest in discussion in the report of other features of Bell System activities.

In the report, for instance, will be found restatements of certain fundamental policies of the Bell System. More than once is there a reference to the policy of the System to furnish the best possible telephone service at the least cost. The financial plan of reasonable and regular dividends only together with opportunity to make additional investments on favorable terms is stated in several places. The present report probably goes further than its predecessors in stating the obligation of the company to its employees "to pay salaries and wages that are in all respects adequate and just and to make sure that individual merit is discovered and recognized."

In furtherance of its plan of furnishing the best service at least possible cost, the report cites the growth of the number of telephone stations as evidence of the reasonableness of cost to the user. Local rates with few exceptions have been stationary in spite of the tendency of the cost of local service to increase as the extent of the service is increased. The reduction in toll rates effecting a saving of about $5,000,000 annually and the reduced license charge to 1½% of gross telephone revenues of associated companies are also cited.

Service improvements in the way of reduction of operating errors, reduction of uncompleted calls and increased speed of toll service indicate the activities of the traffic department of the Bell organization during the year. In the plant department still further progress has been made in speeding up the handling of requests to install or move telephones and in reducing the number of mechanical troubles affecting the subscriber's line or telephone.

The growth of the long distance service is given attention at some length in the report. While the total number of long distance calls increased about 18%, the number of calls over extremely long distances as for instance between the Atlantic and Pacific coasts has increased 100%. Transatlantic service rates have been reduced materially and the facilities are now overloaded, at times requiring the use of a short-wave channel to supplement the regular long-wave channel.

Some of the notable results of the work of the development and research branches of the system were the development of a cable suitable for use in transatlantic service, the development of 1,818 pair exchange cable and extensive improvements in details of equipment and materials. Work on airplane communication and on television has also progressed.

Altogether the year has been one of solid and substantial progress both in a financial way and in the development and improvement of the service of the Bell system and of communications the world over.

Suggestion for Spring Inspection

When the lure of spring calls the executive into the out of doors to make inspections of line and cable plant, may we suggest that the air is as balmy, the birds sing as sweetly and the flowers bloom as brilliantly along the by-roads as along the highways and that the lines on the by-roads frequently are the ones that need attention more and get less than those on the thoroughfares.

Practical Suggestions for Plant Valuation

By CHARLES W. McKAY, M. E.*

It had been the writer's intention, at the termination of the February article, to start the March installment with a discussion of the practical uses to which the appraisal may be put.

However, in reviewing the data as included in the February installment, it is found that the subject of unit costs is not quite rounded out. Hence, before taking up the subject of the use of the appraisal we will consider, very briefly, several rather important elements to the unit cost problem.

Underground Conduit Construction.—The Interstate Commerce Commission's accounting system prescribes that "the cost of service conduits, including cost of pipe, cement, manholes and all other materials used, the cost of connecting to poles and buildings, repaving and other costs incident to the installation of such conduits," shall be charged to the underground conduit accounts. The exchange construction is chargeable to account 244, and toll construction to account 254.

Underground conduit costs are among the most important involved in the appraisement of a telephone property. The truth of this statement will be appreciated when it is realized that the cost of main conduit construction may run as high as $4 or $5 per lineal foot of conduit, exclusive of repaving costs.

Manholes cost all the way from $25 to $30 for a small hand box on an unpaved street to $4,000 or $5,000 for a large manhole in the center of a large city. In one of our largest cities the Bell company has a manhole located at the intersection of two of the busiest streets, which, it is claimed, cost in the neighborhood of $5,000.

It is hardly necessary to state that the high cost of this particular manhole was not due to its size or to the material used in its construction. The incidental expenditures involved in the avoidance of the pipes and conduits of other companies located in this congested district, and in carrying on the construction work without interrupting the city traffic, were responsible for the enormous cost of this particular manhole.

Division of Conduit Unit Costs.—Underground conduit unit costs may be divided into three general subdivisions:

1. Main conduit—conduit between manholes.

2. Lateral conduit—branch conduit to poles or buildings.

Main Conduit Unit Costs.—In Fig. 19 is presented a rather complete analysis of the cost of placing various types and sizes of main (tile) conduit. All these costs are exclusive of the costs of manholes and of replacing the pavement over the subway. They are based upon a complete concrete envelope.

Unit Costs of Lateral Conduits.—The unit costs for lateral conduits are built up in the same manner as those for main conduit, but as a rule they run a little higher. Lateral conduits do not usually exceed three ducts in size.

In addition to the cost of the lateral conduit between the manhole and the pole there is also the cost of providing terminal facilities at the pole. Lateral conduits usually terminate in what are known in telephone parlance as "risers." The cost of risers of various types is shown in Fig. 20.

Manholes and Their Costs.—There are two general types of manholes used in telephone work—brick manholes and concrete manholes.

In a recent valuation of the property of the Chicago Telephone Company a unique system of estimating manhole costs was evolved.

This method consists of estimating a base charge which includes the cost of manhole covers and other similar costs common to manholes of various sizes. To this base charge is added an allowance for the cost of the manhole itself, based upon its cubic contents.

In a recent telephone appraisal where this method of estimating manhole costs was employed, a base charge of $20 was used, and to this base charge was added an allowance of 25 cents per cubic foot excavating. In other words, the contents of the manhole excavation was computed and appraised at 25 cents per cubic foot, and to the result thus obtained an additional charge of $20 was added to cover the cost of placing the casting, etc.

This method may be modified into a more convenient form by applying a unit cost per cubic foot, based on the interior dimensions of the manhole. These dimensions would consist of the average length at the inside of the manhole, the average width, and the distance from the bottom of the manhole to the street level.

It is obvious that if this cubic-contents method is employed in the appraisement of telephone manholes, it is most important that both the base charge and the cost per cubic foot be carefully checked in order to make sure that they meet the individual requirements of the case in hand. This may be readily accomplished by computing the actual cost of several typical manholes in the plant under appraisement, and varying the base charge and the cost per cubic foot until they meet the requirements of the case.

Repaving Costs.—The cost of repaving over main conduit, lateral conduit and manholes is an appreciable item in the appraisal of telephone properties.

Paving costs are almost entirely dependent upon local conditions. It is therefore out of the question to attempt to give actual figures in a general discussion of this subject. Suffice it to say that the local charges for replacing pavement of various types should be carefully checked by the appraisal engineer. Subsequently the total amount of pavement displaced, of each type, should be

CONVENTION SCHEDULE

North Dakota Telephone Association, Powers Hotel, Fargo, March 12th, 13th and 14th.

Oklahoma Utilities Association, Huckins Hotel, Oklahoma City, March 12th, 13th and 14th.

Texas Independent Telephone Association, Texas Hotel, Fort Worth, March 25th, 26th, 27th and 28th.

Kansas Independent Telephone Association, Topeka, April 9th, 10th and 11th.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 16th, 17th and 18th.

Iowa Independent Telephone Association, Hotel Des Moines, Des Moines, April 23d, 24th and 25th.

Indiana Telephone Association, Hotel Claypool, Indianapolis, May 7th, 8th and 9th.

Up-State Telephone Association, Seneca Hotel, Rochester, N. Y., May 22d, 23d and 24th.

Pennsylvania State Telephone and Traffic Association, Harrisburg, May 28th and 29th.

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carefully computed and appraised at whatever costs the appraisal engineer may deem fair for the locality under consideration.

What Underground Cable Accounts Cover.—Under the provisions of the Interstate Commerce Commission's uniform accounting system, the underground cable accounts should cover "the cost of service underground cables, including cable boxes and fittings, loading coils and other materials used in the work of installing such cables, and all of the costs incidental thereto."

These accounts should also include, in addition to the main exchange underground cable, the subsidiary or lateral cables extending from manholes to poles or buildings; the interior block cables (cables within city blocks); building or house cables; and the cables used in terminating exchange and toll feeder cables within the central office.

Number of ducts. 1	Cu. yds. excavation per trench foot. 2	Cu. yds. concrete and mortar per trench foot. 3	Cost tile and miscellaneous material per trench foot. 4	Cost excavating and backfilling and hauling excess dirt. 5	Cost concrete in place. 6	Labor, laying and distributing tile. 7	Hauling tile and concrete material. 8	Total per trench foot. 9	Total per duct foot. 10
2.....	....	....	....	....	....	....	....	....	....
4.....	....	....	....	....	....	....	....	....	....
6.....	....	....	....	....	....	....	....	....	....
10.....	....	....	....	....	....	....	....	....	....
16.....	....	....	....	....	....	....	....	....	....
20.....	....	....	....	....	....	....	....	....	....
28.....	....	....	....	....	....	....	....	....	....
40.....	....	....	....	....	....	....	....	....	....

Col. 4: Tile and miscellaneous material, 4 cents per duct foot.

Col. 5: Excavating, backfilling and handling excess dirt at $1 per cubic yard of excavation.

Col. 6: Concrete and mortar in place, $6 per cubic yard.

Col. 7: Labor distributing and laying tile at 1 cent per duct foot.

Col. 8: Handling tile and concrete material at 1 cent per duct foot.

Fig. 19.—Analysis of subway costs, exclusive of manholes and repaving.

Length of riser (in feet).	3-inch pipe bends.	Vertical pipe.	Labor.	Cost.
..	.....	.....	.....	.....
5	.....	.....	.....	.....
10	.....	.....	.....	.....
15	.....	.....	.....	.....
20	.....	.....	.....	.....
25	.....	.....	.....	.....

3-inch iron pipe.....per foot.

3-inch bends .....each.

Fig. 20.—Cost of lateral risers.

Major Subdivisions of Underground Cables.—There are, then, five major subdivisions under which the subject of underground cable unit costs should be considered. They are:

1. Underground cable proper — exchange or toll cables in main conduit.
2. Subsidiary cable—branch cables from manholes to poles or buildings.
3. Interior block cables—cables along the rear walls or fences of city blocks.
4. House cables—distribution cables within buildings.
5. Central office terminating cables—silk and cotton or wool insulated cables used to terminate the exchange and toll underground cable on the main frame at the central office.

The Underground Cable Proper.—Taking up these five subdivisions in the order of their importance from the cost standpoint we have, first, the underground cable proper.

The same general plan should be followed in building up the unit costs essential to the appraisement of the underground cable system, as has been outlined in Chapter XIV on aerial cable costs. In other words, a careful analysis of material and labor costs for a period of several years preceding the appraisal should first be made, and this analysis used as a basis for determining fair reproduction costs as of the appraisal date.

Fig. 21 presents an analysis of the labor and splicing material costs incidental to the placing of various sizes of Nos. 19 and 22 gauge underground cable. It will be noted that the various items of labor costs, such as rodding, pulling-in, splicing, testing and teaming, are estimated separately. These, together with the allowance for field supervision and the cost of the splicing material, make up the total cost of placing the cable.

It should be clearly borne in mind that the prices given in the tables are merely for illustrative purposes, to show the general method which should be used in building up the unit costs. Material and labor prices fluctuate so rapidly and are so dependent upon the exigencies of individual cases that it is impossible to publish unit costs which will be suitable for practical appraisal purposes. Every case should be carefully considered by itself and all of the variable factors thoroughly analyzed before attempting to build up unit costs. Otherwise, if the appraisal is to be submitted to a public service commission, it will undoubtedly be found that weak spots will develop under the searching scrutiny of the commission's experts.

Subsidiary or Lateral Cables.—The unit costs for the subsidiary or lateral cables should be built up in exactly the same manner as those for the underground cable proper. In all probability the cost per foot of pulling the cable will be found higher in case of the lateral cables. This is due to the fact that lateral conduit runs are not always straight, and that it is nearly always necessary to pull the cable through a bend at its farther extremity, at the point where it turns up the pole or building wall.

Under the heading "Lateral Cables" also comes the consideration of underground terminal or cable box costs. The method of building up these costs is very similar to that outlined in Chapter XIV on aerial cable costs, so it will not be necessary to consider this phase of the subject of unit costs again.

Interior Block Cables.—While the interior block cable plant is part and parcel of the underground system as included under account 245, it is nevertheless a fact that the unit costs involved in block cable work are very much higher than those for either underground cable proper or lateral cable.

This is due to the fact that block

(*Continued on page 28.*)

Gauge.	Pairs	Splicing material.	2% loss and waste.	Total material.	Rodding.	Pulling-in.	Splicing and testing.	Teaming.	Total labor with supervision, 15%.	Total cost, labor and material.
No. 22	25.....	....	....	....	....	....	....	....	....	....
	50.....	....	....	....	....	....	....	....	....	....
	75.....	....	....	....	....	....	....	....	....	....
	100.....	....	....	....	....	....	....	....	....	....
	150.....	....	....	....	....	....	....	....	....	....
	200.....	....	....	....	....	....	....	....	....	....
	400.....	....	....	....	....	....	....	....	....	....
No. 19	25.....	....	....	....	....	....	....	....	....	....
	50.....	....	....	....	....	....	....	....	....	....
	75.....	....	....	....	....	....	....	....	....	....
	100.....	....	....	....	....	....	....	....	....	....
	150	....	....	....	....	....	....	....	....	....
	175.....	....	....	....	....	....	....	....	....	....
	200.....	....	....	....	....	....	....	....	....	....

Fig. 21.—Costs of placing underground cable, 325-foot sections.

The Analysis of the Talking Circuit

By F. J. DOMMERQUE
Fellow A. I. E. E.

It is fair to assume that the reader is familiar with the rudimentary conceptions of physics. If he should want to refresh his memory he may read over again the writer's papers on "Telephone Mathematics and Physics," which appeared in the TELEPHONE ENGINEER during 1926 and 1927, at least those having reference to physical phenomena. The fourth article of this series (July 26, 1926) on the "Problem of Telephone Physics" is of importance in connection with the talking circuit, as it gives an explanation of sound waves and electromagnetic waves, both of which are essential parts of transmission of speech, although they do not appear visible in the circuit, they form its soul, so to speak. We repeat from this article the successive steps in the progress of the transmission from speaker to listener, with a few additional remarks.

1. The sound waves, issuing from the speaker, strike the diaphragm of the transmitter and cause it to vibrate. The diaphragm responds very accurately to the external actuating forces. But the amplitudes of the diaphragm vibrations are very small, consequently the currents produced are very weak. To produce strong vibrations and to send them over long distances an induction coil, acting as a transformer, is introduced, the primary winding of the coil forming a circuit of low resistance, fed from a battery.

2. The transmitter diaphragm, when vibrating, produces *changes* in the pressure of the carbon contacts, whereby the resistance of the primary circuit is changed correspondingly; whenever the carbon particles are compressed, the resistance in the circuit decreases and the current can flow easily; whenever the pressure is released and the carbon particles become loose, the resistance increases considerably and the amount of current flowing in the circuit is reduced. This increase and decrease in the amount of current thus transforms the ordinarily continuously and uniformly flowing current into a changeable or variable current, which takes the wave form of the speech. This process of superposing the speech wave form upon a continuous or direct current may be defined as a process of "modulation."

The changes of resistance in the primary circuit act upon current and electromotive force in the secondary circuit of the induction coil.

3. The induced currents are transmitted over the line to the receiver at the other end of the line. We have in mind a line of copper wire or of any metallic conductor. The process to be followed in radio telephony is somewhat different in execution, but similar insofar as carrier currents are used for modulation with the speed currents. Our analysis will leave radio telephony out of consideration as a science by itself, with exception of a few remarks.

4. The currents induced in the secondary of the induction coil produce *changes* of intensity in the magnetic field of the receiver, whereby

5. The receiver diaphragm is thrown into vibrations starting sound waves which are carried to, and perceived by, the ear of the listening party.

The Line

Of course the line always forms a part of the talking circuit and for that matter the most costly part. In addition, it is in the line where the real seat of all transmission troubles is to be found. As is known from the article on "Wave Distortion on Long Telephone Lines" in the TELEPHONE ENGINEER of October, 1927, when waves of complex harmonic frequencies, such as are transmitted over telephone lines, have to travel over great distances, they are *attenuated*, and the upper harmonics are more vigorously attenuated than the lower frequencies, which causes a distortion of speech. Such distortion can be mitigated by loading the line; but loading coils in conjunction with other apparatus inserted in the line cause reflections, which may produce echo currents, which are still more pronounced when repeaters are used. Against all these evils must be guarded. As all these irregularities belong proper to the theory of transmission, we will not enter into same, but assume that we have to deal only with a comparatively short line such as the ordinary subscriber's line, where such difficulties do not arise.

Grounded lines are considered a thing of the past, as far as the talking circuit is concerned. Subscriber's lines are cabled nearly throughout the country, with the exception of former lines, and the cabling of toll and long distance lines is progressing rapidly. Therefore, grounded lines for talking may be left out of consideration. The line will be assumed to be metallic, to consist of two conductors of copper of a resistance which is compatible with good transmission.

The Fundamental Talking Circuit

Taking first the simple case of a transmitter, a receiver and a battery connected in series as shown in Fig. 1. It has been found that the changes in resistance in a transmitter during talking amount at the most to a few ohms. Assuming the resistance of the transmitter in its normal state to be 25 ohms, the resistance of the receiver to be 50 ohms; adding to this, say, 100 ohms for line resistance, the total resistance of the talking circuit including two transmitters and two receivers would be 250 ohms; assuming furthermore the voltage of the battery to be 4 ohms, then the current would be $\frac{4}{250} = 0.016$ amperes or 16 milliamperes. If we now deduct the "change" in transmitter resistance, we would obtain the total resistance as $250 - (25 - 5) = 230$ ohms, if we take the resistance decrease as 5 ohms. The current would then be $\frac{4}{230} = 0.0175$ amperes or 17.5 milliamperes, which would indicate a very small change. Therefore, a circuit as shown in Fig. 1 would be extremely inefficient on a line of 100 ohms; if we made the line very short, it might do for a case, where the service required would not need to be particularly good, as is the case in house or private installations, but for regular commercial service such a circuit would be out of the question. If the transmitter and battery were placed in the primary circuit of an induction coil with low resistance, say of 0.5 ohms, the resulting current would be increased sufficiently to give good service with a properly constructed line.

There is another defect in the talking circuit of Fig. 1, namely that continuous current flows through the receiver, causing a weakening of the permanent magnet in case the field of force due to the current, is of opposite direction to the permanent field of the receiver. We, therefore, come to the circuit shown in Fig. 2.

There are different opinions as to the design of the induction coil. It is a hard

task to calculate the windings and the dimensions an induction coil should have. It will be found that each manufacturer builds his coils different from the others, he builds them to suit his other appa-

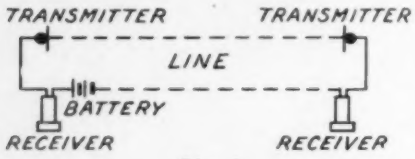


Fig. 1

ratus. The old time induction coil had a straight open core of fine iron wire. This coil is greatly favored, but coils with a closed core consisting of thin laminations seem more advantageous as far as the winding is concerned. They require less copper and consequently are cheaper for the same results. Fig. 3 shows one of the closed core induction coils.

The Source of Current

In practical operation a dry battery, consisting of two or three cells, has been used for local battery subscriber's stations, while for the simpler common battery stations a storage battery at the telephone exchange furnishes the current. In course of time the voltage for such a storage battery has settled down to 24 volts for local service, and for long distance transmission to 48 volts.

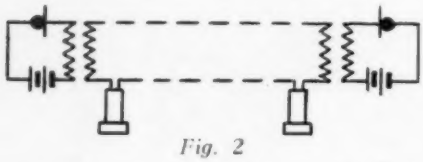


Fig. 2

The difficulty met with in common battery operation consisted in a disturbing noise caused by the charging machine; it propagated over the line to the receiver of the listening subscriber. The battery itself diminishes slightly the effects of this noise. For a long time special charging machines were necessary, designed with a great number of commutator segments in order to permit of acceptable service, but since the invention and introduction of socalled "filters," the noises can be entirely overcome and any ordinary commercial charging machine may be employed, not only for charging but also for floating during busy hours.

In order to insure against any kind of effects caused by current fluctuations it has been found expedient to insert a retardation between common battery and line. The best and most practical location for this retardation is to place a retardation coil in the cord circuit, as for instance shown in Fig. 4. The battery provides the energy for the transmitters; the talking currents are prevented by the retardation coils to propagate through the battery and from one talking circuit into another, they have to pass by the coils from A to B, or from C to D.

The arrangement as indicated in Fig. 4 is not customary; in place of the retardation coils transformers are used, which are in this case named "repeating coils." The windings are arranged as shown in Fig. 5. When the talking circuit is closed, the battery current will flow from the positive pole of the battery through the two upper windings of the repeating coil to the right and to the left into the subscriber's lines, and after they have passed the subscriber's stations, which are for convenience drawn

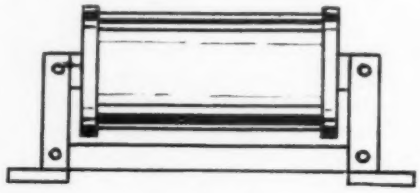


Fig. 3

in abbreviated form with a transmitter and receiver in series, back again over the two lower windings of the repeating coil to the negative pole. Thus each subscriber has his own part of the talking circuit, which is divided into two halves by the repeating coil. When A talks, the windings 1 and 2 of the repeating coil form the primary side, and when B talks the windings 3 and 4 form the primary side of the transformer; correspondingly the primary and secondary windings have as a rule the same resistance and the same number of ampere turns.

There is still another way of arranging the retardation, which presents the advantage of serving at the same time for signaling purposes, while the talking currents find a direct path by the way of condensers, these condensers separating the two sides of the cord circuit as far as the flow of continuous current is

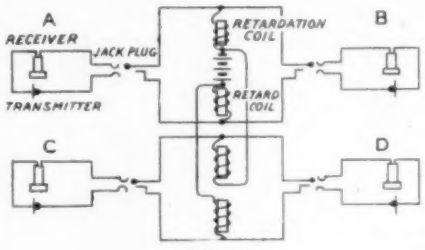


Fig. 4

concerned. Fig. 6 gives a schematic view of this arrangement.

In drawing up the above fundamental arrangements for the common source of energy for the transmitters we have employed the form adopted for manual operation as indicated by the plugs and jacks. In automatic exchanges the same requirements prevail and the above-mentioned methods of providing energy may be, and are employed, only the energy finds its path over switch contacts instead over plugs and jacks.

At this juncture it may be mentioned that in practice the common battery is always grounded at its positive terminal

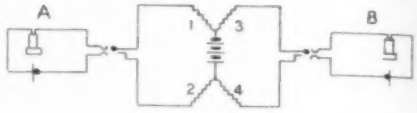


Fig. 5

to make the lines and apparatus which differ in potential from the earth, negative to the latter, so that any leakage currents that may exist will flow from earth toward the apparatus. Were the opposite the case, the line wires and particularly the coil windings connected to the free pole of the battery would be positive to earth and so suffer corrosion from leakage currents.

In wireless or radio telephony everything remains the same as in wire telephony up to the tollboard where the talking circuit is switched onto the line leading to the antenna. Therefore, there would be no need of speaking about this; however, there is one phenomenon in wireless transmission we would like to call attention to. In radio communication high frequency currents, socalled "carrier currents," are modulated with the voice currents; such high frequencies are not any more perceptible by the human ear. The question may be asked,

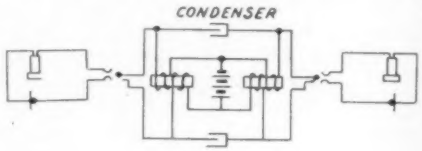


Fig. 6

how are these modulated vibrations demodulated in order to obtain a motion of the receiver diaphragm corresponding to the changes of the incoming vibrations or waves. To effect this a "rectifier" is required. There exist various kinds of rectifiers, but the most advantageous means for rectifying is provided by the electron tube, which serves also as amplifier by using the energy delivered to it to draw upon a source of current made available by the plate battery.

The action in the rectifier may be interpreted as follows: When the high frequency current strikes the receiver diaphragm, the push and pull effects change so rapidly that the diaphragm is unable to follow and thus remains immovable. If the same current is passed first through the rectifier, which permits passage of currents flowing in one direction only, the push and pull effects will accumulate and set the diaphragm in corresponding motion, the extent of which depends upon the amplitude of the current waves; these motions reproduce or repeat the motion of the waveform as originally produced in the transmitter. After having passed through the rectifier the cur-

rent waves can be transmitted over a wire line and thus serve to complete a talking circuit.

Some day we may be able to discuss carrier currents as used in long distance telephony on land lines. Then we will meet with practically the same phenomenon.

In any talking circuit in operation means must be provided to open and close the circuit. These means are essential to give service, but represent only an element in the equipment and as such do not interest us here.

Parsons Heads Illinois Telephone Association

A. J. Parsons of Carbondale, Illinois, was elected secretary and treasurer of the Illinois Telephone Association at a

A. J. Parsons of Carbondale, Ill., Newly-Elected Treasurer of Illinois Telephone Association

meeting of the directors of the association held at the association's office in Springfield February 14. Parsons took charge March 1st. He supersedes Ed. D. Glandon of Pittsfield, Illinois, who has been acting secretary and treasurer since January 9, 1929, the day on which the resignation of Jay G. Mitchell, the former secretary and treasurer, was accepted by the board of directors.

Parsons has had approximately forty years' experience in the telephone business. For the past several years he has been general manager of the Illinois Commercial Telephone Company, probably the largest Independent telephone company in the State of Illinois. This Company owns and operates telephone properties in about one-third of the counties of the State of Illinois.

Parsons will move to Springfield and will devote all of his time to the affairs of the Illinois Telephone Association, which is the trade association representing the telephone industry in this state.

Stromberg-Carlson New Radio Receiver

Due to the discovery of a method of mounting an electro-dynamic speaker unit in a specially designed type of baffle compartment, Stromberg-Carlson engineers claim they have built a radio receiver with a built-in loud speaker that measures up to the fine quality of reproduction which their receivers have gained during the past three years with the use of external loud speakers.

In the No. 638 receiver which has just been announced, a special baffle compartment which slides into the top of the receiver cabinet and in which special highly efficient electro-dynamic equipment is mounted is said to be one of the reasons for the tonal excellence of the new product. This compartment has a solid front baffle board and flaring side members which combined with the receiver cabinet construction provide ample baffling for the desirable low frequency reproduction and at the same time avoids the usual cavity resonance that is so disturbing to some musical reproduction and, in particular, to speech.

In addition to obtaining high quality reproduction by the previous methods, the No. 638 all-electric receiver has a special audio system, using two UX-171A tubes, arranged in multiple in the output so as to provide a big increase in the undistorted power output of the receiver. This special audio system, coupled with the Stromberg-Carlson dynamic speaker, gives a wealth of volume that is possible in less efficient loud speaker units only when the UX-250 type of output tube is used in conjunction.

From an engineer's standpoint, this is a notable achievement for it produces the same over-all results with fairly low voltages and therefore greater safety and reliability, that usually necessitates the use of higher power tubes with correspondingly higher voltages in the power supply system.

The new receiver employs three stages of tuned radio frequency amplification: a detector and an audio system using two UX-171 tubes in multiple. It tunes with a single illuminated dial, the only other controls being the "off and on" power supply switch and the volume control. The volume control knob has an auxiliary mechanism whereby an electro-magnetic pick-up may be thrown into the circuit when phonograph records are to be reproduced. This mechanism allows the pick-up to be permanently attached to the radio receiver. The cabinet is built entirely of walnut and both the operating panel and the dynamic speaker grille may be closed from view by means of walnut doors.

The new receiver is furnished in console model only and is made for 105 to

Stromberg-Carlson's Newest Type Radio Receiver

125 volts 60 cycle A. C., 25 to 60 cycle A. C. and D. C. areas.

Double Telephone Service Is Denied

Oklahoma City, Okla.—The Marland Telephone Company was denied a permit for toll service between Marshall, Lovell and Covington in an order Tuesday of the corporation commission.

Service of the Southwestern Bell Telephone Company was held to be satisfactory and this company was ordered to start immediate construction of toll lines between Marshall and Lovell, center of a new oil field.

Putnam Co. Phone Company Formed

Columbus, Ohio.—To operate a telephone and telegraph system in the various communities in Putnam County, the Community Telephone Company of Leipsic has been incorporated. The company will issue 600 shares of common stock, no par value. Beginning capital $500. Incorporators are B. W. Ginther, G. W. Fike and J. W. Lowry.

Telephone lines now touch all the important towns and villages in Palestine and the use of the telephone there is steadily increasing.

Within the next two years the Marseilles (Ill.) Telephone Company expect to build an office building on the west of the lots on Washington St.

Telephone System Opens New Radio Station

By E. R. COLLINS

Manitoba Telephone System, Brandon, Manitoba

In Canada, the owner of every radio receiving set is required by law to pay an annual license fee of $1.00. While there are, no doubt, quite a number who evade this small annual charge, those who do pay, contribute a large sum into the treasury of the Dominion Government at Ottawa. This money is collected by the Department of Marine and Fisheries, through such channels as the post office and radio dealers, and in Manitoba through the offices of Manitoba telephone system.

The issuing of broadcast licenses is also under the control of the department of Marine and Fisheries. The province of Manitoba through an arrangement made some six years ago, had retained for itself the right to control broadcasting licenses in the province of Manitoba. The commissioner of the Manitoba Telephone System has the power to approve or reject any application submitted for broadcasting in the province of Manitoba. The result is that the Manitoba telephone system virtually has a monopoly of broadcasting in Manitoba. There was quite a lot of criticism from radio enthusiasts, when this arrangement was made, as two firms then operating in Winnipeg closed their stations, and the Manitoba telephone system opened Station CKY in the city of Winnipeg. The wisdom of this move however is becoming more evident as time goes on, and one observes the fight to restrict broadcasting in United States.

Radio Station CKY has been operating for some six years and has rendered good service to the people of Manitoba. This station was a 500 watt transmitter. This was replaced last fall with a new 5000 watt transmitter. The new station has much greater range than the old one, and a fine class of programmes has been broadcast since it went on the air.

The equipment released at CKY was renovated, and transferred to Brandon. It was installed here by two of the men from the Manitoba telephone system shop at Winnipeg, and went into service on the night of Dec. 11th, 1928. The call letters of the Brandon station are CKY. It operates on a wave length of 555.5 meters, or 540 kilocycles.

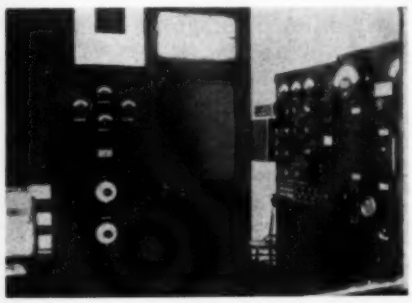
Brandon is the second city in Manitoba, with a population of about 22,000. It is located on the main line of two transcontinental railways, the Canadian National and the Canadian Pacific. It is about 150 miles west of Winnipeg, and about 80 miles north of the United States boundary. The Assinaboine river flows through the city, and supplies a safe supply of water, which is filtered and pumped out from the city owned water works. The city owns the street railway system, but the power supply is operated by a private corporation. The power company operate a system of central steam heating, which was installed about 1911, and serves the business section of the city. The power house stack can be seen in photo No. 1. This results in a very clean smokeless business section and insures a very satisfactory, safe and economical method of heating. This is especially noticeable in the telephone exchange, since there is no dust from a local furnace to get into the equipment.

No. 1
Broadcasting Station of the Manitoba Telephone System, Manitoba, Canada, Showing Towers and Studio

The highways leading into the city while not paved are surfaced with gravel, and are what we term all weather roads. Each year sees an increasing number of tourists coming to visit our city, and enjoy the privileges of our free tourist camp. If any of our readers are coming this way next summer, be sure and visit the Telephone Exchange. Today, however, the temperature is 42 below zero, so why think about tourists now?

Brandon has had the Strowger automatic telephone system for eleven years, and the citizens are justly proud of the service rendered. Our rural lines, some 70 in number, also operate automatically and although some of the lines are over 32 miles long, they give dependable service through great extremes of weather.

But to get back to our radio station. In photo No. 1 you can see the two towers to support the antennae. The studio and operating room, are housed in the building directly under the antennae. The towers and studio are located on the city hall grounds. The towers were supplied and erected by a local firm, the Ames Baker Company, and they have no reason to be ashamed of the job they made of them. They even gave the steel work two coats of aluminum weatherproof paint after the towers were erected. Each tower is 160 feet above ground, being anchored with concrete bases. The towers are 180 feet apart, and the foot of each tower has a spread of 30 feet. The antennae is supported by ¾" rope, and each rope is attached to a winch which can be seen in No. 1 photo on the ground in the centre of each tower. A safety rope is clamped to the main rope about 30 feet above the ground and snubbed to the tower. This is to prevent some mischievous person from dropping the aerial.



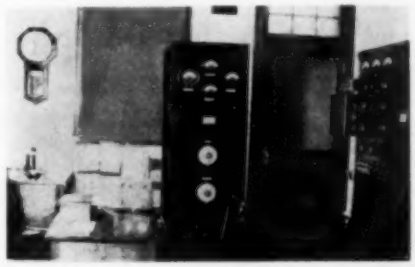
No. 2
Operating Room as Seen from the Studio Through Window

The aerial is a cage type, composed of 4 stranded bronze wires, using 8" copper rings as spreaders. These rings are soldered to all four wires. The flat top of the antennae is 130 feet between insulators. The lead is similar to the flat top, only 2" rings are used instead of the larger ones. The lead in is taken into the building by use of a standard lead in insulator.

On account of the public nature of the city property it was not possible to use a counterpoise. A heavy copper network was laid underground, and connected to the ground under the Studio.

The studio building, is a frame structure, with stucco covering, and asbestos shingled roof. Sound proof construction was used throughout. As an example, there was fastened between the joists, hung in a U shape, ½ in. fibre matting, such as comes in the top and bottom of barrels of dry cells. Then on the joists a rough floor was laid, next ½ in. insulating matting, ½ in. ten test board, matched flooring and then battleship linoleum. The outside walls had a covering of shiplap, metal lath, and stucco, outside the studs, with a layer of ten test fibre board, strapping, then lath and plaster inside. The walls between rooms were also heavily insulated so that the whole building is sound proof. The building is heated with the central steam heat, so even if it shoulld be 42 below zero outside, we can be warm inside.

The interior of the studio proper is draped to prevent sound reflections from the plaster walls. This room is com-



No. 3
Another Interior View of Operating Room as Seen Through Studio Window

fortably furnished for the comfort and convenience of the artists. A large plate glass window is provided between the studio and the entrance hall and there is also a similar window between the studio and operating room.

In photos Nos. 2 and 3 you have two views of the equipment in the operating room as seen through this window. To the left is the power board and the speech input amplifier. The panel to the right is the transmitter proper. It is equipped with four 250 watt tubes and a 50 watt amplifier tube and auxiliary equipment. This equipment was made by the Western Electric Co. and was supplied by the Northern Electric Co. of Montreal, Canada.

Photo No. 4 is taken in the power room. Here is located the motor generator set and battery equipment. The first unit of the generator set is the 14 volt direct current generator to supply the current to the filaments of the tubes on the transmitter. The second unit is a 1600 volt direct current generator to supply the plate current for the big tubes. The generator ripple of this machine is wiped out with a filter system. The filament current for the speech amplifier tubes and the current for the studio microphone is supplied by storage batteries. There is a duplicate set of these batteries and a Tungar charger to recharge them. The plate battery for the speech amplifier is composed of No. 6 dry cells, 132 volts being required.

All the wiring in the building is taken through grounded conduit to prevent any reaction of the radio frequency current on the other parts of the wiring.

On the table in the center of the operating room is located the pick-up box. There is a 15 pair lead covered cable running from this box to the telephone exchange for telephone lines and remote control lines. There is a local automatic telephone and also a magneto desk telephone which is connected to a regular toll line jack on the toll board. These two lines can be answered by an operator who sits at the desk in the corner. An operator's set with a two-way key permits connection to either line. At times these two lines are kept busy.

On the opening night of Dec. 11th we had installed a Western Electric Public Address system in a local church. We concealed two of the big horns inside the pipe organ and connected them to the public address amplifier. The amplifier was connected by cable to the output of the speech amplifier at the studio and the program broadcast was reproduced in the church for the benefit of the large crowd gathered there. Then the public address amplifier was reversed and the microphone connected. At the studio the public address line was connected to the input side of the speech amplifier. An organ recital was then played at the church for the benefit of the church audience and also broadcast to the radio listeners.

There was a program being broadcast over CKY at Winnipeg at this time. This was put on in the studio of the Hudson Bay Co. of Winnipeg. For one-half hour this program was sent to Brandon over a toll line and broadcast over CKX and also reproduced for the church audience. At the close of this program the church audience was dis-

No. 4
Motor Generator Set and Power Room

missed by the singing of the national anthem. Then a dance program was broadcast over CKX from a local dance hall.

It was quite a big order for our opening night but we put it over without any trouble. This station is being operated by the local telephone staff and goes to show how closely radio broadcasting is connected with the telephone business.

Stations CKY and CKX are the only two broadcast stations operating within the province of Manitoba.

Communication Is an Element in National Progress

By RAY BLAIN

It is claimed by good authority that we have progressed more in the last twenty-five years than we did during the two hundred previous. Most anyone can assign a good reason for this from the advent of the automobile to prohibition. The majority seem to agree, however, that cheap reliable transportation is perhaps the greatest agent in bringing about this great change.

With due respect to the tremendous advantages of transportation I am of the opinion that communication has never received the credit it deserves, I do not believe that our present transportation systems could have been developed without reliable wire communication.

Consider for a moment what would happen if we were suddenly deprived of all means of communication other than by word of mouth. Without their swift reliable wire communication (which at the present time is mostly telephone) our railroads would be practically paralyzed as they could not run trains as fast or as frequently; nor could they utilize their trackage to the same degree of efficiency. Schedules would be impossible and wrecks would be frequent. Ship disasters would be frequent with tremendous loss of life and property were it not for the help of radio communication. Airplanes are just coming into their own and without frequent weather reports from different points along their routes they would not be able to furnish the reliable service as at present. These weather reports at the present time are handled on the longer routes mostly by radio and telegraph. Some of the shorter routes are using the regular long distance toll service. I am of the opinion that after the volume of traffic has increased to a point that will warrant it, the longer lines will lease telephone circuits so that they can keep in constant touch with all airdromes. Most fatal accidents up to the present time in commercial aircraft can be traced to incomplete weather reports or a disregard to the reports of approaching storms. Bus lines are becoming popular in certain sections of the country and even they make use of communication to a certain extent as they call over long distance frequently to ascertain weather and road conditions. To sum it all up, our transportation on land, water and in the air could not be as extensive, as safe nor as efficient had we not developed communication systems to meet each particular requirement.

The civilization of a country seems to advance in proportion to the development and extension of its communication systems. When Dean Wooster started out to tame the headhunters in the Philippine Islands he stated that the first thing to be done was to construct roads connecting the different villages or barrios so that the natives would be encouraged to visit each other, intermarry and be friends. His theory being, should they become friends, they would value each other more with than without heads. It is very probable that this same rule could hold true between more civilized nations, for as we become better acquainted with other nations through the telephone, radio, talking movies and in time, television, they should have a higher regard for us and we for them and consequently we may eventually enjoy that perfect state of universal peace that so many have dreamed of but few ever considered possible to attain through so simple a means as cited above.

Some will bring up the question as to how people in a foreign land will be able to communicate with us as they do not understand our language. There is a peculiar thing about this and it will perhaps in time work to our disadvantage. Due to our large foreign trade with nearly all the countries of the earth we have forced large numbers of people in them to learn English. Another reason for this is perhaps that most of them are linguists, while about the hardest thing for the average American to do is tot learn any foreign language. The American's vocabulary, even after living in a foreign land for years, is usually limited to a few swear words and those necessary to order a drink. While visiting several foreign countries and ships from almost every land I was surprised to find that at no time was I unable to find someone that could understand English. There is no doubt in my mind but that in time the problem of a universal language will work itself out satisfactorily without the use of Esperanto.

Another peculiar thing about our communication systems is that one kind does not become obsolete and replaced by another newer one which is so often the case in other lines.

The regular mails carried by trains and ships have not been replaced by the air mail and perhaps never will be. The air mail traffic seems to be an increase over the regular mails which are not decreased in volume by it. Neither did the telephone replace the telegraph as many feared that it would at the time, but by utilizing modern methods and reducing rates the telegraph is now in most localities handling more business than at any time in its history. The radio did not replace the cables for transoceanic communication but by acting as a feeder to it the traffic over both are constantly on the increase. Radio is of primary importance for ship to shore traffic and between ships at sea.

There is no denying that radio broadcasting plays a very important part in the scheme of things today. We hear severe criticism against chain broadcasting, but I am of the opinion that this is the only reason that broadcasting has been able to hold the interest of people and to prosper. For the same reason it is impossible for a show to put on as good a performance to a hundred people as it can to a thousand, so it is impossible for any concern to pay for as expensive an entertainment to one station covering a small territory as it is to a chain covering the greater part of the nation. While there has been great improvement made during the past few years in both transmitting and receiving equipment there has not been much progress made toward the control or elimination of that arch enemy of radio, "static," or to my knowledge is there any relief in sight. Thomas A. Edison has never taken much interest in radio as he does not consider it a success due to the static interference. The useful range of any broadcasting station is only that which it can cover consistently and give clear reception and with the average station this is comparatively small. There is no denying that a means of communication with the greater part of the population of a nation simultaneously is a very useful asset. Without the use of telephone toll lines to connect the various major broadcasting stations at the present stage of development of the art of radio this would be impossible.

I am of the opinion that a nation-wide program service could be furnished by the telephone companies that would provide better quality of entertainment, free from all interference and absolutely reliable, without the bother and expense of maintaining equipment by the user, at a much lower cost, than the present system of broadcasting.

It is not probable that any radical

change will ever be made in the present broadcasting scheme due to the various interests involved. However, I do believe that there are great possibilities in certain localities for wired program service if it is properly promoted by the local telephone companies.

While all of our means of communication are helpful, perhaps the most useful of the lot is the telephone. Hardly a day passes but what most of the people in the United States make use of a telephone at least once. It is always ready to serve our wants in the home, the place of business, the club, the hotel room and in most filling stations or hot dog stands along our traveled highways. It summons help in case of an emergency such as sickness, accident or fire. It makes it possible for the farmer to buy and sell on the distant city market as well as the local village. In fact it makes us all neighbors with the entire nation.

The telephone is perhaps at the present time entering upon one of the greatest eras of its history. Street traffic in the larger cities is becoming a serious problem and is slowing up industry. It seems that the larger cities have now reached a point that some action must be taken to give them relief. It is believed by many that the logical solution of the problem is decentralization. This means that instead of a concern having both a large factory and executive offices in the downtown section of a certain large city it will have a general office in the city and a dozen or more smaller factories scattered through the smaller communities. This decentralization is already under way as few of the larger corporations attempt to do all their manufacturing at one location or to conduct all their distribution from one or two centers. Not so very long ago the largest mail order houses tried to cover the entire country from their Chicago headquarters. Now they are dotting the country with retail stores and distribution centers. The automobile manufacturers have adopted the policy of locating assembly plants in many different sections. It seems that industry is learning to make use of its communication systems which makes it possible for them to subdivide or separate its functions in a territorial sense. The president of a large concern can be located in the executive offices in the larger city and by utilizing the modern telephone service can keep in practically as close touch with the business scattered through several communities as it would be possible for him to were it all located in one city.

Perhaps the greatest advantage of this arrangement is that the workers can live closer to their work, afford better homes and be able to reach the job on time in the morning without hours of travel, perhaps hanging on a strap and be worn out before the work of the day starts, so that they cannot give their best efforts to the job.

It is very likely that a concern of this nature will arrange with the telephone companies to set up a circuit at a specified time each day for a certain period, connecting the main office with all branch offices so that a conference can be held that will be as beneficial as though all were assembled around the conference table. Or perhaps it will be arranged to connect the main office with each branch office in turn for a specified period of time each day. In cases where the volume of traffic warrants, arrangements may be made to set up toll circuits each morning for the entire office day connecting the P.B.X. switchboards so that almost instant communication can be had between any of the units. Telephone companies should be able to furnish contract service of this nature at a much lower rate than the circuit holding charge on a regular toll call. Toll rates are constantly decreasing and no doubt that by the addition of circuit facilities made possible by the installation of inter-city toll cables throughout the country, the rates will be further decreased. The larger volume of business with a smaller margin of profit seems to be working out in the telephone business with the same success that it has in various other lines.

There is no doubt but that at the present time many firms could make use of these low toll rates to good advantage and realize a saving over the old letter writing methods. The cost of letters of course differ in each company but I believe that the cheapest that most concerns estimate is fifty cents each. There are many toll calls that can be made that would not average more than this amount and the immediate action feature of the call over the letter has many advantages. There are other advantages of the call, for example a sales letter can be easily delayed or forgotten, as it is much easier to reply in the negative when dictating to a stenographer than to someone that calls up on the telephone.

It seems that the time is opportune for someone to develop some simple device for recording the conversation on important calls for use when a permanent record is desired. The dictating machine has been used for this purpose to a certain extent with success, but it seems that a machine could be devised which would be more suited to the requirements.

Some claim that the country as a whole is prosperous, while others claim that it is not and perhaps both are right. Those that claim we are prosperous offer as proof that we have more of the world's goods individually and collectively than ever before in history. The annual report of the secretary of commerce states that the volume of production and consumption of the year just passed as a whole and the physical exports and imports were large, employment was relatively unimportant and the rate of real wages and the standard of living of the masses of the people remained higher than anywhere else in the world. Power production, building construction, sales of department stores, chain stores and mail order houses all showed increases and most of them the highest ever recorded.

Regardless of whether the country is prosperous or not it is quite evident that more business was conducted during the past year in the United States than ever before. While all means of communication helped to make this possible there is no doubt but that the telephone played the most important part and handled the bulk of the business. The continuance of this large volume of business seems to

Appreciates Telephone Engineer

Moose Jaw, Sask., Feb. 14, 1929.
Editor, TELEPHONE ENGINEER,
Chicago, Ill.
Dear Sir:

As another Canadian subscriber to your valuable magazine, I wish to express my appreciation of the interesting and educating articles, which you publish. During the past year the writings of E. R. Collins and F. J. Dommerque have been especially instructive to many, and show that these gentlemen have a thorough knowledge of the practice and theory of Telephone Work. I should also mention Ray Blain who must be a real old-timer who has kept up with the times.

In your latest issue of January, 1929, which I have before me, the article on "Inductive Interference" written by Mr. B. C. Burden was much appreciated. We, in Western Canada and in Saskatchewan in particular, have only in the last two years entered into the development of the Electric Light and Power industry, except as it applied to the larger centers of population.

The results of this development have been, that we now have the Induction problem to deal with in our communication systems. If you can publish more papers and data such as that written by Mr. Burden it will be very helpful. In particular I would request that someone with experience write a paper on the causes, effects, and remedies where a 3-phase 4-wire, grounded neutral system is the cause of induction to a telephone system.

Thanking you Mr. Editor for your past and future help, I remain,

Sincerely yours,
J. A. INCH,
Wire Chief.

The Strowger Automatic Telephone Exchange
OF CHICAGO
invites you to attend the
Installation
of its First System, demonstrating
the practical application of an
Automatic Exchange
at La Porte, Indiana
November 3rd 1892.
and requests the favor of an early acceptance

The document reproduced above is an invitation to a demonstration of the working of the La Porte, Indiana, Strowger Automatic exchange, held on NOVEMBER 3rd, 1892. The switch shown is one of the first Strowger Automatic switches of the type used at La Porte, the original principles of which are still incorporated in the present day Strowger switches.

STROWGER AU
TELEPHONE

The Growth Of An Idea

NDER a franchise granted July 18, 1892, by the city of La Porte, Indiana, to the Strowger Automatic Telephone Exchange of Chicago, Illinois, the first automatic phone exchange in the world was placed in everyday operation. The invitation wn in the accompanying illustration, states on its inner page that the automatic tem "entirely obviates the many annoyances to which subscribers are at present jected, besides being much more economical than the system now in use," and that rough this system a degree of perfection has been reached that will be of great mmercial value and enhance many fold the uses of the telephone."

the thirty-seven years that have elapsed since those words were written, the phone world has seen their truth proven by hundreds of Strowger Dial exchanges in ery part of the world. From this first small installation in La Porte, Indiana, the owger Dial Telephone System has grown to be the pre-eminent telephone system of day, its economy of operation a matter of record, its ruggedness and durability ested by years of use, and its superior performance highly acclaimed by thusiastic telephone users wherever it has been installed.

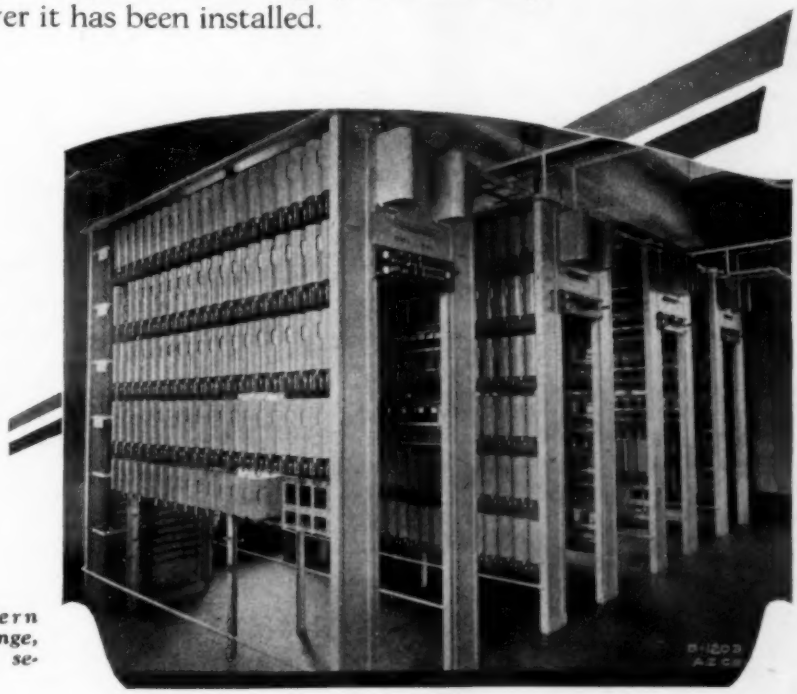
tomatic Electric Inc.

Manufacturers of
trowger Dial Telephone Systems

Factory and General Offices:
West Van Buren Street, Chicago, U. S. A.

les and Service Offices in All Principal Cities

EXPORT DISTRIBUTORS
Australasia—Automatic Telephones, Ltd., Sydney
For Canada—
pendent Sales & Engineering Co., Ltd., Vancouver
Elsewhere—
The Automatic Electric Company, Ltd., Chicago



A typical modern Strowger Dial exchange, showing group of selector switches.

WGER AUTOMATIC
LEPHONE EQUIPMENT

be assured as various telephone companies are constantly enlarging and replacing their plants and facilities in order to keep a few steps ahead of the big business and it is seldom that their forecasts fail and that equipment is installed which is not needed within the time estimated.

Practical Suggestions for Plant Valuations

(*Continued from page* 18)

cables have to be clamped to building walls or rear fences. Where the cable is to be attached to brick, concrete or stone walls, it is necessary to drill the walls at intervals of 18 inches or 2 feet, and inset expansion bolts for holding the cable clamps properly. This process of installing block cables is a laborious and costly one at best.

Unfortunately it is rarely possible to place block cable in a straight horizontal run near enough to the ground to be readily accessible to the workmen. The additional cost of making detours to avoid obstructions, and to so place the cable as to render it comparatively free from danger of mutilation, is an appreciable one. It is frequently necessary for the men to work in inaccessible places, using ladders and in some cases platforms swung from the roofs of the buildings.

All of these factors necessarily tend to materially increase the cost of block cable work. In some cases it will be found that the average cost per foot for a given size of cable is three or four times the cost per foot of the same size of cable placed in conduit. Fortunately the interior block method of distribution in most plants is confined to a comparatively few blocks in the congested commercial districts.

If desired, unit costs per foot may be built up in much the same manner as described for the determination of the cost of the underground cable proper. However, in the larger cities the relative value of the interior block cable plant is comparatively small, and an experienced appraisal engineer can usually estimate a cost per city block that will be close enough for all ordinary purposes. This cost per block may vary from $200 to $1,000 per block, according to the size of the cable used and to the difficulties encountered in its installation.

House or Building Cables.—The unit costs of house cables are largely dependent upon the type of building in which the cable is placed. In modern buildings, where large and readily accessible vertical cable shafts are provided, the unit cost will be appreciably lower than in the case of old buildings where the ingenity of the construction gang has been severely taxed to find a suitable place for the cable. In cabling many of the older buildings in the larger cities it has been found necessary to drill walls at frequent intervals, to fish cables under floors, and in some cases to cut channels in the building walls for the vertical riser cables. The installation methods therefore have to be considered.

It is difficult to outline a detailed method for estimating house cable unit costs. Undoubtedly the best way of evaluating this portion of a telephone company's plant is to have an experienced appraisal engineer go over the original construction plans and make a separate estimate for each of the buildings involved. These estimates may, in many cases, be verified by consulting original records of cost, taking into consideration the differences of material and labor market prices at the time of original installation and at the time of appraisement.

Central Office Terminating Cables.—Fig. 22 shows the method of computing the unit costs for the central office terminating cables. In this connection it will be realized that the cost per foot for a short length of a given size cable will be appreciably higher than the cost per foot of a long length of the same size cable. This is due to the fact that the labor of splicing and fanning the cable on the main frame is an appreciable factor.

Silk, Cotton and Lead Covered Cable

25-pair, No. 22 gauge—

8-foot cable at	$.....
Miscellaneous material	.....
Total	$.....
2 per cent loss and waste	.....
Total material	$.....
Total labor	.....
Total cost	$.....
Unit cost per foot	.....

50-pair, No. 22 gauge—

10-foot cable at	$.....
Miscellaneous material	.....
Total	$.....
2 per cent loss and waste	.....
Total material	$.....
Total labor	.....
Total cost	$.....
Unit cost per foot	.....

200-pair, No. 22 gauge—

12-foot cable at	$.....
Miscellaneous material	.....
Total	$.....
2 per cent loss and waste	.....
Total material	$.....
Total labor	.....
Total cost	$.....
Unit cost per foot	.....

Fig. 22.—Unit costs of terminating underground cables.

Where various lengths of a given size or gauge of cable are encountered, it is well to compute the unit cost per foot on the basis of the average length. This unit cost may subsequently be applied to the total number of feet of cable, as shown in the inventory.

Now taking up the subject of the practical uses of the appraisal it may be said that these uses consist of the following:

1st—The appraisal is of intensely practical use for rate-making purposes.

2nd—An appraisal is always required for purposes of purchase or sale.

3rd—An appraisal is necessary for purposes of refinancing and merger.

In the last two instances the appraisal may vary slightly in form from that used for rate-making purposes. In other words, short-cut methods may be adopted —as the appraisals are used primarily for presentation to bankers as others who are vitally interested in purchase, sale, refinancing and merger propositions. Bankers, as a rule, do not care for detail but they are vitally interested in the results and to know that the valuation was prepared by a competent engineer.

Underlying Theory of Telephone Rate-making.—In one of the opening chapters of this series the various uses of the telephone appraisal was discussed in some detail. Of these uses the function of the appraisal in building up reserve funds and the function of the appraisal in rate-making probably are the most important. The function in the appraisal in building up the depreciation reserve was discussed in the previous chapter. In the present chapter the function of the appraisal in telephone rate-making will be considered.

Anyone who has glanced over the record of a rate case without previous acquaintance with the subject may conceive the idea that the matter of telephone rate-making is very complicated. The records of rate cases are apt to be voluminous and are likely to convey an impression of complexity. The underlying theory, however, when shorn of all the frills which must necessarily be added in the course of adjudication before regulatory bodies, is exceedingly simple.

William N. Messe of 304 S. Brainard avenue, LaGrange, for the last year assistant manager of the Western Electric Company's Hawthorne Works in Chicago, has been promoted to the membership of the company's new $15,000,000 Point Breeze, Baltimore, telephone cable and wire works, construction of which has been started. Mr. Messe will be succeeded as Assistant Works Manager at Hawthorne by George A. Pennock, 120 Clinton Avenue. Both changes become effective January 1, 1929.

Studying Telephone Methods

By E. R. COLLINS

Manitoba Telephone System, Brandon, Manitoba

CHAPTER 25

Universal Cord Circuit

A cord circuit that includes all the features of the different circuits studied is shown in Fig. 212. This is a combination circuit for connecting common battery lines to rural or toll lines. It is not desirable to connect long toll lines to cord circuits used for local common battery service. The balance in these cords is not sufficiently accurate to prevent noise from showing up on the toll line. The circuit shown in Fig. 212 has three general functions.

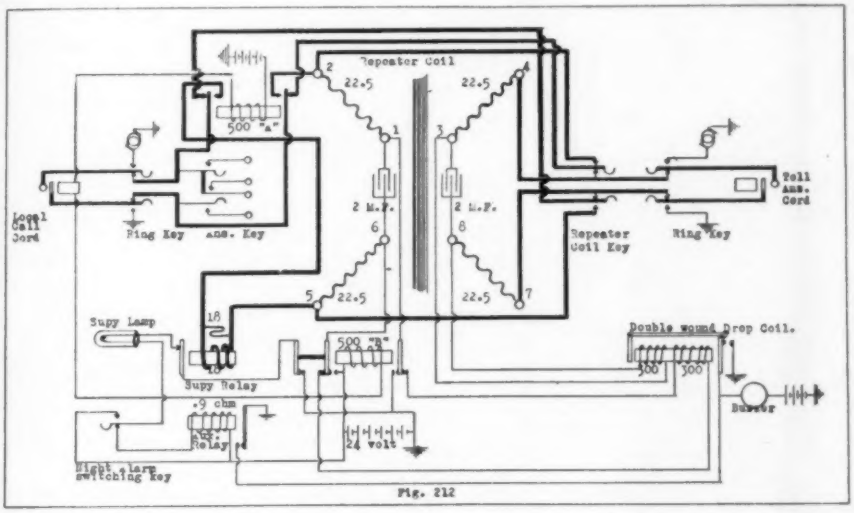


Fig. 212

1. To connect two magneto lines such as toll or rural lines with a straight cord circuit.

2. To connect two magneto lines such as toll or rural lines with a repeating coil connected betwen the two lines.

3. To connect a local common battery telephone to either a toll or rural line.

Straight Magneto Service

The talking circuit for two magneto lines connected with this circuit can be traced over the heavy lines of Fig. 212. Commencing at the tip of the calling plug, the circuit is through the normal contacts of the ringing key, normal contacts of relay "A" which is not operated, normal contacts of the repeater key, through the ringing key to the tip of the answering plug. The return circuit can be traced over a similar route commencing at the ring of the plug. This circuit is quite simple. Commencing at the answering plug trace the heavy circuit back through the repeater key to No. 4 and No. 7 of the repeating coil. Then through the windings to 3 and 8. There is a 2 M. F. condenser bridged across these two terminals. But because the other half of the repeating coil is open both at the make contacts of relay "A" and also at the make contacts of the repeater key, the impedance of the 4-7 side of the coil will be high impedance, so that there will not be a very bad drain of the voice currents in this circuit. Then there is a 300 ohm winding of the double wound drop coil connected across these terminals 3-8. Due to the combination of the impedance of the repeater coil, and the drop coil, and the capacity of the condenser, the ring off signal receives sufficient ringing current to operate. In Chapter 15, which appeared in the April 1928 issue, we discussed the drop of ringing voltage. This was illustrated in Fig. 121. With an applied voltage of 90 across terminals 4-7 there would be approximately 50 volts across terminals 3-8 or across the terminals of the ring off signal. This signal has the same relation to both the calling and answering cords, so that it will respond to a signal from either direction. As a result if an operator was to ring from one line she would operate the ring off signal of this cord circuit, and would ring out on the other line as well. While this may be a bad operating feature, the cord in this condition is the most efficient from a talking standpoint.

Magneto Circuit with Repeating Coil

Where a single or grounded line is connected with a long metallic line, it is necessary to connect a repeating coil between the two lines to prevent the unbalance making the two lines when connected noisy. The reason for this was discussed in Chapter eleven in the December 1927 issue of the TELEPHONE ENGINEER. In Fig. 212 the repeating coil can be connected in circuit by operating the repeating coil key. 4 and 7 are connected permanently to the cord circuit as shown in the previous paragraph. When the repeater key is operated, its make contacts connect terminals 2-5 to the calling cord through normal contacts of the relay "A," which is still unoperated. Now we have a 300 ohm ring off drop coil across the 1-6 terminals of the repeating coil and the other across the 3-8 terminals. As soon as the both sides of the repeating coil are connected to their respective lines the impedance to voice currents drops according to the load placed on the coil by the lines. Then referring back to Chapter 15 again, we find that if 90 volts were applied to terminals 2-5, the voltage across (3-8) due to this ringing current will be very small, somewhere about 3 volts. Therefore a ring from one line will not affect the other line. If instead of using a double wound coil, the two separate drops were used, the operator would know whether the ring off signal was coming to the calling or answering cords. This gives two way supervision, and also a non-ring through feature. The sleeve of the toll or rural lines is left dead for the foregoing arrangements, so that the relays in the cord circuit do not operate.

Common Battery Telephone Connected to Toll or Rural

When a local common battery telephone is connected it is necessary to connect the left hand or calling cord to the common battery telephone. The sleeve of the common battery line jack will be grounded direct, or through a 30 ohm cut-off relay. Therefore when the calling plug is connected to a common battery line, the two relays "A" and "B" will pull up. These two relays will be parallel. Therefore if each is 500 ohms, the parallel resistance will be 250 ohms. This in series with the cut-off relay of 30 ohms gives 280 ohms. For 24 volts this permits a current flow of 80 millamperes.

Relay "B" connects negative battery to No. 6 of the repeating coil, and positive battery or ground to terminal No. 1 of the repeating coil. Relay "A" connects the calling cord to the terminals 2 and 5 of the repeating coil. This supplies battery to the common battery telephone with the winding of the supervisory relay (and its non-inductive winding in parallel), connected in series with the line. The position of the repeating coil key makes no difference to the circuit when used for this service. The supervisory lamp is supplied with battery

through the winding of an auxiliary relay for night alarm service.

For the above features, we have had to add quite a number of extra contacts into the cord circuit. Each contact is a possible place to cause trouble due to dirt or poor pressure of the springs. To check for trouble on such a circuit we will need more testing apparatus. A hand generator equipped with resistances, or the office generator cut down to proper voltage, will be required to check the operation of the ring off drop when features 1 and 2 are used. The operation of the ring off drop will have to be tested when the common battery feature is used. This drop should be made to respond whether the local common battery is connected or not. Also it should be tested for operation when connected to a local common battery telephone, with the receiver on the hook, also when it is off.

The operation of the lamp signal should be checked with the test set provided for testing the common battery cord signals. A further test for uniformity of the common battery side of the cord can be made by using an ammeter. The Weston Model 280 is a very convenient type of meter to have in any telephone exchange. The low ampere scale can be used to connect to the tip and ring of the common battery cord. In the circuit Fig. 212, the resistance of the common battery cord will be as follows:

Winding 1-2	22.5 ohms
Winding 5-6	22.5 ohms
Super, relay 18	
Non-ind., coil 18	9 ohms
Resistance of cord	4 ohms
Total	58 ohms

This will give a reading of 4/10 of an ampere. Any variation in the current flow should be investigated. Suppose for instance that winding (1-2) was short. Then the current flow would be increased to 6/10 ampere. The cord in this condition would talk loud one way, but very poor the other. Therefore unless you tested for talking in the right direction you might miss such a condition.

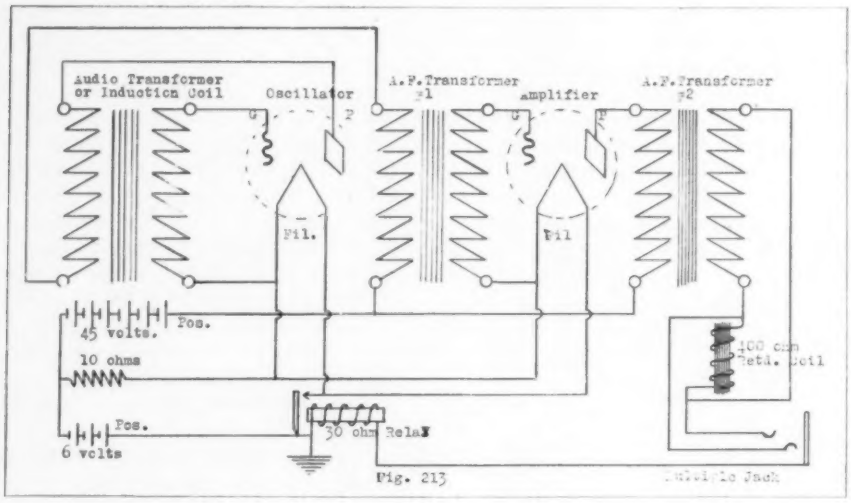


Fig. 213

Transmission Losses

The main object of a cord circuit is to provide a low loss path for the voice frequency currents to travel. The telephone man must be on the alert to detect any defects which might cause poor transmission of the voice. These losses often are present when other tests would indicate a normal cord condition. There have been developed transmission measuring sets for this work but as yet they are too costly to be in general use by the smaller companies. The plan followed is to transmit a voice frequency of 1000 cycles at a known strength. This is measured at the transmitting end. This current is transmitted over the line or through the apparatus to be tested, and the current received at the other end is measured by a receiving set. The difference between the energy sent, and that received are known as the transmission loss. This is computed in units, known as transmission units or T. U. We do not intend to discuss measuring in T. Us. because, unless the apparatus is available, the terms signify very little. We can however get some practice with this method, and also weed out some of the larger defects in central office equipment as we will describe in the following paragraphs:

The Transmitter

We must have a set to generate the tone or the 1000 cycle frequency current. In the July issue 1927 we described a tone set using a radio tube and 2 No. 20 induction coils to generate the tone supply. We assume that those interested have made up some type of a tone set. For our purposes however we will require the oscillator set and one stage of amplification to build up a signal of sufficient strength to use for the present tests.

In Fig. 213 we show the circuit of an oscillator set and a one stage amplifier. No doubt all our readers are familiar with radio amplifiers by this time. A No. 20 induction coil can be used for the oscillator coil, or an ordinary audio transformer might give a low enough frequency. A. F. transformer No. 1 has its primary connected in series with the oscillator plate coil. This couples the amplifier tube to the oscillator. Transformer No. 2 is necessary to prevent the plate battery from going out through the line or receiving set used. A 400 ohm retardation coil is bridged across the secondary of the second audio transformer. Usually the secondary of an audio transformer used for radio work has a winding of 3000 or 4000 ohms D. C. This will not pull up the supervisory signal of a common battery cord. The result of the test with the supervisory relay armature pulled up is different to the same when the armature is normal. There is a 30 ohm relay connected to ground. The armature of the relay is also shown grounded. This grounds the 6-volt battery used to light the tube filaments. Unless this is grounded the tone is apt to kick up quite a racket. The ground in most cases will prevent this spreading. The tone amplifier set we will call the transmitter. This should be enclosed in an iron box, and the box grounded. Unless this is done, the tone is likely to be picked up by relay coils, etc. The transmitter can be located in the rack room, and the output of the transmitter connected to a spare multiple jack on the switchboard. The sleeve of this jack is connected to the relay in the transmitter. The resistance in series with the filaments of the tubes will have to be adjusted to suit the tubes you are using. The whole set is dead as long as the relay is normal.

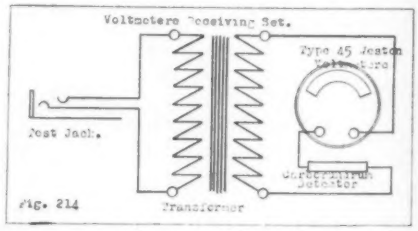


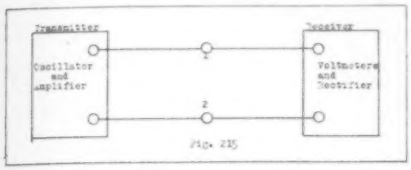
Fig. 214

The Transmitter should be adjusted to about 1000 cycles. This will correspond approximately to the key "a" above middle "c" of a piano tuned to concert pitch. The Frequency is adjusted by the capacity of the condenser connected across the grid coil of the Transmitter. Try values of ½ M.F. for this. Two ½ M.F. in parallel will give 1 M.F. while two ½ M.F. in series will give ¼ M.F. So you can get quite a range using the ½ M.F. type of condenser.

The Receiver

The receiver used is shown in Fig. 214.

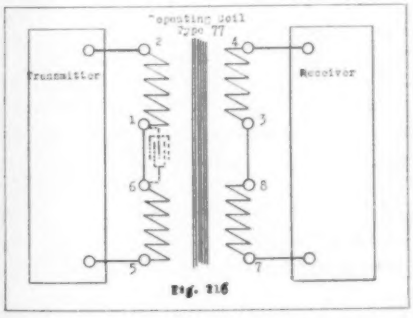
This consists of an ordinary repeating coil or an audio Transformer to block any battery coming into the meter. A Type 45 Weston Voltmeter was used for the following measurements. This is the type of meter used in the average Telephone Exchange to measure the voltage of the individual storage batteries. This has a scale of 2.8 volts and suits the purpose very well. A micrometer will be best to use for this purpose if you have no suitable meter on hand. This meter is connected in series with a carborundum Crystal detector or rectifier. The rectifier and the voltmeter terminals will both have to be reversed on test to



see which combination gives the best reading. A switchboard jack is connected to the set, and the whole may be mounted on a board to carry same.

In Fig. 215 is shown the method of using the set. Connect the transmitter to the receiver and read the meter. On the set the writer uses, this connection gives a reading of 1.7 with a straight connection between the transmitter and receiver. Some care will have to be taken not to jar the rectifier as the reading will be changed. If the rectifier is wrapped in wadding, and placed inside the voltmeter case (the type 45 has quite a space inside the case) it will be out of harm's way.

Now take the set to the switchboard, insert one plug in the receiver, and the



other in the multiple jack going to the transmitter. The relay in the transmitter pulls up and the transmitter instantly sends out the high frequency current. Read the meter for several cords in succession and note the average reading. The reading will be lower than that obtained when the transmitter and receiver were connected straight together.

In Fig. 216 we have illustrated the transmitter and the receiver connected through a type 77 repeating coil. When the transmitter was connected to (2-5) with terminals (1-6) connected, and the receiver connected to (4-7) with (3-8) connected together, the reading obtained was 1.5. This indicated a loss of energy between the transmitter and the receiver. The reading through the cord circuit will also indicate a loss of energy.

Referring back to Fig. 215 again, suppose a 75 ohm receiver is connected across at (1-2) the reading will drop to 1.0. When an operator's set using a No. 24 type induction coil is connected across (1-2) Fig. 215, the reading drops from 1.7 to 1.2. A 2000 ohm radio heat set connected across the same terminals will drop the reading from 1.7 to 1.65. It is quite evident that when the telephone operator is listening on the circuit, that the amount of energy available for the subscriber is cut down. The same thing applied when a rural subscriber is roosting on a line. Now if you read the drop of voltage when a cord circuit is connected, and then note the additional drop when the operator's key is opened, you will have a loss value of the operator's circuit when bridged across the cords. Now you can compare the loss caused between different positions, when the operator is bridged across the line.

Now you might say what is all this for. It is only of value for comparison, and any decided difference in reading would at once be evidence of trouble.

Referring again to Fig. 216, there is a condenser connected between (1-6) instead of the jumper as shown by the dotted lines. Reading as connected in Fig. 216, changing the condenser values ½ M.F. at a time, shows the following:

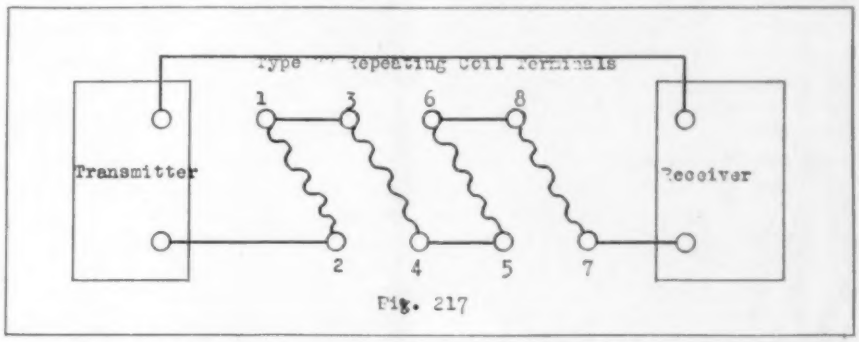
½ M.F.	1.2 volts.
1 M.F.	1.3 volts.
1.5 M.F.	1.3 volts.
2 M.F.	1.4 volts.

These readings show the difference of reading caused by different capacities connected across these points. Therefore if incorrect condensers have been used the reading will indicate a difference. Again if we short circuit (1-2) and read, we get 0.9 volts. But if we short circuit (3-4) instead with the transmitter and the receiver still connected in the same way, the reading is 0.1 volts. This would indicate that it would be wise to read each cord circuit connected first, say with calling cord in the transmitter and the answering cord in the receiver. Then reverse and read and see if the reading is the same in both directions. *It should be the same.* A little practice will soon enable you to make considerable use of this testing apparatus.

Measuring Impedances

One often wonders what is the best combination of the terminals of a repeating coil to give the greatest impedance. In Fig. 217 the terminals of a 77 type repeating coil are shown connected in series with the transmitter and the receiver. The windings of the coil are connected between (1-2), (3-4), (5-6), and (7-8).

Now jumper (1-6), (4-8), (517) and connect the transmitter and receiver to



terminals (1-3). This gives a reading of 1.25 volts.

Next jumper (1-3) (4-5) (6-8 and connect tone to (2-7). This drops the voltage from 1.7 to 1.3 volts.

Next jumper (2-3) (4-6) (5-8) and connect tone to (1-7). This drops the voltage from 1.7 to 0.3 volts. This is then the combination of the three that gives the greatest impedance. In this way it is possible to get the comparative values of different impedances.

We can go even further. Suppose you want to measure the resistance of an impedance to say 1000 cycles. First read the voltage through the impedance. Then use a variable resistance such as are now available for radio work. (*Only a good make is of any use.*) Adjust this to give the same reading as obtained with the 1000 cycle current and the impedance. Then you can measure the ohmic value of the setting of the variable resistance, and you have the approximate impedance in ohms of the inductance you are reading.

Even suppose no immediate benefit is derived from the above experimental work, it will serve as a good introduction to the use of the more expensive apparatus, and will open up to you a new field of interest.

The apparatus discussed will enable you to get a closer uniformity in the equipment under your care, and remember that, *uniformity in cord circuits, and trunk circuits is absolutely essential to smooth, efficient telephone service.*

Ramblings

By J. A. S.

Over in Wisconsin an operator of a "beauty parlor" has brought suit against the telephone company in the amount of $10,000 for listing her and the "old ladies' home" under the same number. Speaking out loud, we'd say she had a kick coming, but mentally we sometimes think the patrons of some of these "beauty parlors" should be connected with the "home for feeble minded" in a more material way.

* * *

Last month we listed the coming conventions, places and dates, but somehow failed to mention the Pennsylvania meeting at Harrisburg, Pa. Just how we came to pass up the home of H. E. Bradley we are unable to say for every telephone man thinks of Brad when he thinks of Pennsylvania. For gosh sake, don't fail to list Harrisburg, May 28th and 29th, on your convention list when making it up.

* * *

Early in March the writer and his wife shook the Illinois snow from their feet and are trekking back to the old home in Texas for a visit while attending the Oklahoma and Texas conventions. After a siege of weather such as has prevailed in Chicago the past two months we are almost convinced that the wail of the old-fashioned circuit rider concerning the frying pan of the hereafter is a myth, at least as far as the northwestern section of the United States is concerned. The fellow of pitchfork fame would have a heck of a time even warming up things in this section; if he did he'd even attract a larger crowd than the one offering sunshine, roses and perpetual rest.

* * *

It's just a little late to mention the fact, but we cannot let the opportunity pass of congratulating the Northern White Cedar Association upon the selection of Wilbur L. Lefean as president of that organization for the coming year. He was elected to that position at the January meeting at Minneapolis. That organization needs a good dose of "high life," and we believe that if the association can be rejuvenated Wilbur can do it. Mr. Lefean is president of the Naugle Pole & Tie Company of Chicago, and is well equipped in experience and knowledge of the business to conduct the destinies of the cedarmen.

* * *

Secretary William L. Smith of the Wisconsin Telephone Association has been appointed executive secretary to Governor W. J. Kohler. Mr. Smith's home is at Neilsville, Wis., but telephone men having business relations with the new governor of that state will always receive a welcome by the secretary at least.

* * *

George Rodormer of the Reliable Electric Company spent his midwinter vacation in Florida. He returned early in February, but his wife and daughter remained in the sunny south until a later date. George certainly loves his golf, but never fails to make the round of conventions. "Business before pleasure," says George.

* * *

Friend J. G. Odegard, secretary of the North Dakota Telephone Association, writes us that they are going to hold the biggest telephone convention in the history of that state and urges that we attend the meeting. Here's our hand and heart, friend Odegard, but we are dated for a meeting at Oklahoma City at the time of your meeting, and are looking forward to that time, when we can thaw our toes, gaze again at old man sunshine and feed on that good old corn bread and turnip greens, cooked only as the old southern mother can cook 'em. We'll be glad to visit you later on.

* * *

And Henry Ford is telling the younger generation to spend. Having raised a very thrifty son under the John D. Rockefeller rules of taking care of the dimes and the dollars will take care of themselves, until the son is safe from spendthrift habits, Henry advises the young ones to spend—and Henry has something to sell. Henry invented a motor that cost less to make and operate than others, and it made him a millionaire; but who is spending the millions? No one. Who is profiting by his millions? No one. Of course he pays good wages; but that is good business. Hundreds of thousands of others pay good wages. Henry will pass on in a few years, and who will mourn his passing? Certainly no charitable institutions, hospitals, schools or religious institutions. Yes, thousands of laborers will miss him—for a while. But we doubt if his memory will last longer than a Ford car after his demise.

* * *

We are not a believer in movie advertising; and besides, we haven't much to advertise. But if the reverse were true, we believe that thousands, and possibly millions, who have attended the Chicago Theater, will agree with us that the rear face of the leader of the very excellent orchestra of that wonderful show would afford an excellent place on which to place a sign that would not be missed by anyone attending the show. This certainly can be said to be the bright spot of the show.

* * *

And Tom Edison works smilingly on. Recently he celebrated his 82nd birthday. He is doubtless the most distinguished citizen of the United States; he has probably contributed more to the comfort and pleasure of the world than any other person. Nothing Horatio Alger ever wrote has surpassed the story of a youth whose pluck and persistency won for him greater achievement. And the story is not yet finished, for Mr. Edison is still as active as ever.

* * *

The banquet still remains the most important event on the program of telephone conventions. Though too busy to attend the sessions of the convention, we've noticed that many fellows drive miles and miles to participate in the evening's entertainment. We are glad they attend these gatherings. Indulging in social entertainment should be practiced more than it is. But we hope they will not overlook the matter of learning to put better business methods into their work, too. All sessions should be well attended.

* * *

Is it possible? We hope it's true, but we have at least passed through Missouri, even though we cannot claim to have resided there. The following from Topeka, Kan., will probably be a shock to thousands of telephone people throughout the world. We haven't the lowdown on this exchange, but if we ever pass through that section we are going to stop and investigate. Listen:

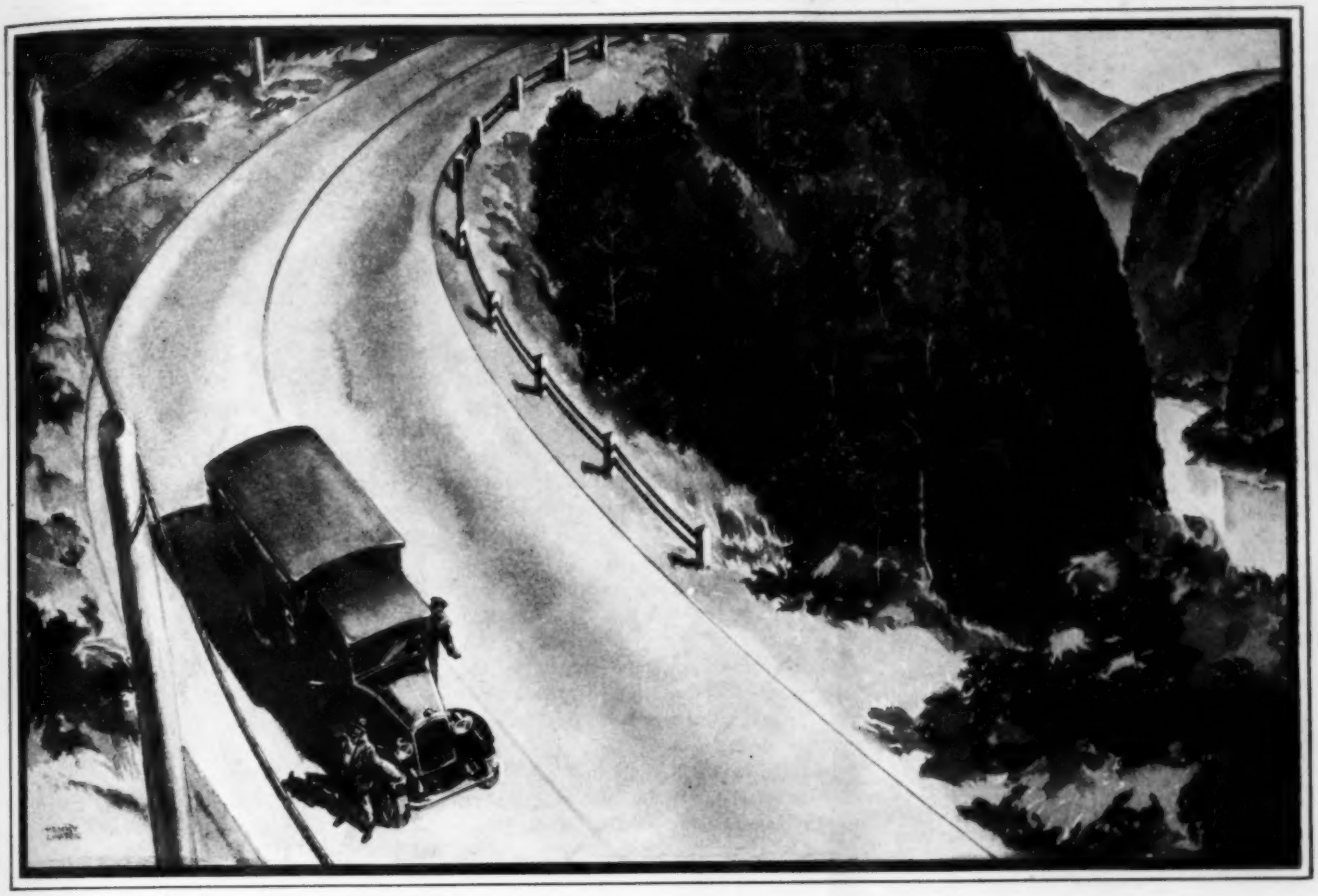
"Members of the Kansas public service commission received a shock today when R. W. Powers, secretary of the Wilsey Telephone Company in Morris County, asked authority to reduce rates 25 cents a month on both business and home services. Thousands plead for increased rates before the commission. The Wilsey manager admitted his company was making too much money."

* * *

We pass! In conversation with a gentleman at the Wisconsin meeting recently we asked him if he reads this publication. He said not regularly, but he liked it. Asked if he wanted to take a copy of the February issue home and read it, he said that was not necessary—that he had a copy in his desk, which he had been keeping for five years.

* * *

Our good friend, W. S. Paca, of Oil City, Pa., sends us a copy of "The Announcer," a pamphlet issued by Station WLBW of Oil City, and containing a number of pages of information regarding that station and its programs. Of course you know W. S. Paca, manager of the Petroleum Telephone company of the slick little city, and we understand that he is financially interested in WLBW. "The Announcer" gives a program for each day in the month, as well as many other interesting features of that station. It also contains a log of the stations throughout the country.



Getting there ahead of the trouble

An Advertisement of the
American Telephone and Telegraph Company

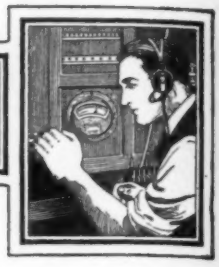
DURING the afternoon of March 17, 1928, an alarm bell rang in a telephone test station in the heart of the Alleghany mountains. This meant that a puncture had been made in the air-tight sheath of a busy inter-city cable. The men on duty knew that the injury was somewhere within 50 miles.

Highly-developed locating devices were instantly applied and in sixty-five minutes the trouble spot was located. By 7.15 in the evening, before the break in the sheath had affected service on any of the 248 pairs of wires in the cable, the repairs had been made. Because of the preliminary warning on the indicator wire and the locating devices that enabled the test station to tell the repair crew just where it would find the trouble, not one conversation was interrupted. This special alarm system is one of the many mechanical and electrical wonders developed by Bell System engineers to guard telephone conversations. The apparatus is placed along the cable routes at intervals of 100 miles. It gives instant warning day or night of any disturbance to the cable within 50 miles in either direction. Automatic warning signals, electrical locating devices, constant testing of all switchboard apparatus and circuits—these are some of the ceaseless efforts that so effectually reduced interruptions to service on Bell lines in 1928.

There is no standing still in the Bell System. Constant progress in accuracy and better and better service at the lowest cost is its goal.

"THE TELEPHONE BOOKS ARE THE DIRECTORY OF THE NATION"

LINE AND DESK



THE PROJECTING LADDER HAZARD.

An accident report quoted in Southern Telephone News reads as follows: "truck was parked with front wheel against the club but on account of building material the rear was three feet away from the curb. A ladder was attached to the left side of truck and extended four feet beyond the rear end of the truck and while the crew were working in a building, a passenger car passed and scratched right hand door against the ladder."

This particular accident was in no way serious but there have been many accidents due to the same cause which have had serious results. It is an accident of a type that permits of no mechanical preventive measures. The only practicable means of prevention is care on the part of line crews who must carry ladders as part of the equipment of their trucks. Ladders are frequently placed on the ladder irons so that they project several feet beyond the rear end of the truck. Often this is pure carelessness on the part of the crew of the truck as plenty of room is available to place them further forward.

The hazard is increased by improper parking as was the case in the report cited above. Trucks are frequently parked so that the projecting load extends into the part of the roadway which is normally free for travel. Where this occurs the driver of the truck must assume the blame for the accident for he has unnecessarily obstructed the highway. The remedy here is care in parking or if it is not possible to park without leaving the ladder projecting over the road it should be removed from the truck or a man stationed to flag traffic past the obstruction.

As in the case of many other hazards, the best preventive measure is to "think safely"; that is to keep in mind at all times the safe way of doing work and to watch every detail of the loading of the truck, its handling on the road and its parking when the crew is working, so that the possibility of accident is reduced to a minimum.—Staff Contribution.

THE PLANT ENGINEER'S JOB.

The matter of cable design in the extension and rearrangement of cable systems represents one of the most interesting and important phases of plant engineering. These plans require careful investigation into the condition of existing circuits, consideration of the probabilities as to direction and amount of expected growth and the solution of unique problems in economic selection to determine the general plan of extension to be followed, the area to be served, the number of circuits in the cable, etc. The design of individual cables includes, among other factors, the selection of the proper gauge of conductors to meet certain transmission and resistance standards, the determination of how many times and at what locations each pair will be terminated, the decision as to the most economical points at which additional cable may later be introduced and the preparation of working plans. As the Plant Engineer lays down a cable today in a conduit run or as he puts up a cable on a pole line, its design must be such that it can be adapted to future changing conditions, with the minimum expenditures for changes.

Consideration must be given, not only to service requirements and economy in the cable design, but also the practicability of carrying out the work from a construction viewpoint, and the selection or design of the containing or supporting structures, such as underground conduit and pole lines.

One problem in the design of an underground conduit system is consideration of the proper type, size and location of the manholes, which are used to facilitate pulling in and splicing cable sections and to provide means for extending cables into buildings or to poles.—Hanse Hamilton in The Transmitter.

COTTON MAY TAKE PLACE OF SILK INSULATION

Cotton can be substituted for silk, or less silk can be used, in electric wire insulation as a result of recent studies in Bell Telephone Laboratories. The commercial application of a textile washing process there developed will effect considerable improvement in quality and reduction in cost of textile-insulated wire. One type of wire widely used in the Bell System can now be insulated with two instead of three coverings of silk, at an annual saving of 70,000 pounds of silk. Various types of telephone wire with a total annual output of over two-billion feet will soon be insulated with washed textiles. These results of researches into the electrical properties of textiles were presented by R. R. Williams, E. J. Murphy, H. H. Glenn and E. B. Wood, of the Bell Laboratories' technical staff, before a meeting of the American Institute of Electrical Engineers in New York on January 31.

Their data indicate that electrical conduction in textile materials, such as silk and cotton, takes place through thin filaments of salty water, and that, when the moisture content of the textile changes, these filaments change in size, shape or number in a way dependent on the kind of textile. The animal fibers seem to differ from the vegetable ones in this respect. The total conduction allowed by a bit of textile appears to depend on its size, its origin, its moisture content, and the amount of salty matter in it which will dissolve in the moisture to form the conducting solution. The moisture is absorbed from the air; the amount absorbed depends on the humidity of the air. These dependences have been expressed mathematically in a way which makes it possible to predict the conductivity of a sample from a knowledge of its size, kind, and content of moisture and salt. The conductivity of any kind of textile, on the other hand, seems to be little affected by the way its fibers are put together. The greatest practical interest lies in the effect of soluble matter, such as sodium and potassium salts. These materials are present both as natural constituents of textiles and as impurities. Their solutions, due to moisture absorbed from the atmosphere, form the conducting paths which reduce the insulating quality of textiles. Furthermore, the products of their electrolytic decomposition at certain points along the wire sometimes destroy the wire or textile or both.

Since the disadvantageous substances in textiles are water-soluble, they can be removed by washing the textile thoroughly in water. The water must be pure and must be renewed frequently or continuously. By such treatment the electrical resistance of the textile can be increased about fifty times. It is by such washing that cotton is made as good an insulator as the untreated silk which has formed a necessary part of the insulation in the past.

A&C Inc.

Always Dependable

Type 21 Desk Stand for Common Battery Service
Type 200 Desk Stand for Local Battery Service

The outstanding characteristic of American Electric telephones is their thorough dependability. Considered from every viewpoint, they offer the operating manager an assured satisfaction because of their excellent transmission efficiency, their positive wearing qualities, and the excellent appearance they present.

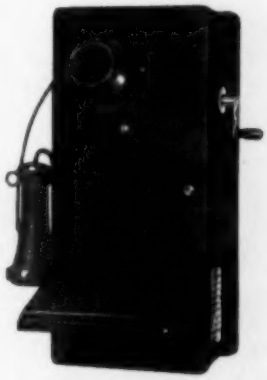
The secret of the transmission efficiency of American Electric telephone lies in the design of the transmitters, the design of the receivers, and the circuits used, all of which are based on sound telephone principles, long proven in actual operating practice.

Each type illustrated has been developed to withstand hard usage and yet this sturdiness has been obtained without sacrificing graceful appearance. For with each one, the operating manager can feel certain that his company is represented by a telephone that is as pleasing in appearance as it is unfailing in operation.

THE MONOPHONE

Made in a variety of styles to meet every requirement of either common battery or local battery service.

The Type 21 Wall Set for Central Battery Service



Type 200 Wall Set for Local Battery Service

Available in ebony black and oak finish.

American Electric Company, Inc.

State and 64th Streets

Chicago, U. S. A.

BRANCH OFFICE AND WAREHOUSE: 7TH AND WYANDOTTE STREETS, KANSAS CITY, MISSOURI

Toll Line Maintenance

By W. C. WHITE

Wire Chief, United Telephone Co., Fredericksburg, Texas

To the operating company, copper toll lines represent a large investment. This being true, it is desirable that they be productive of as much revenue as possible. To bring this condition about, we must give toll service about which there can be no complaint.

No one likes to talk on a poorly maintained line on which there is a constant mumble of cross talk or other line noises, but when each party can hear distinctly what the other has to say, there is a lingering temptation to call again.

While in the employ of a large operating company, I noticed, in handling poor transmission reports, that the condition of the toll lines of the small connecting company was often the cause of the complaint. With proper manitenance methods many of these lines can be made as good as any, and a correction of these faults would be of mutual benefit to the toll customer, the local company, and the company operating the long lines.

To bring lines up to their best, and that should be the goal of every man responsible for their maintenance, series resistance unbalance tests should be made to determine the actual condition of the line in that respect, especially on phantom groups. Upon one occasion when clearing up a cross talk condition on a new phantom circuit, I found an unbalance of five ohms in an old circuit which had been used to make up one side of the phantom. This was found to be caused by a piece of rusty iron wire which some lineman had spliced into one side of the copper circuit years before, and the wire had so much the same appearance that the difference was not known until the pole was climbed to examine the sleeves.

I give below two methods of making this test, either of which can be used by the plant man of ordinary skill. A Wheatstone Bridge is used and every telephone system should have a first-class bridge.

If only two wires are available for the test, measure their loop resistance. Ground them at the distant end, set bridge for Murray Loop, using ground return, and rebalance. If rheostat reading exceeds 1000, reverse connections to line and rebalance. Unbalance, U, may be computed from the Formula:

$$U = \frac{Rx\ (A\text{-}R)}{A+R}$$

A=Ratio Arm A
R=Rheostat Reading
Rx=Loop resistance
U=Unbalance

Set arm A on 1000 and arm B on zero.

Other methods can be used, but the one described above is the one I have generally used.

If a phantom group is under test, the following, which is called the three-wire method, is a good one. Short all four wires of group together at distant end. Call wires A, B, C, and D. Measure loop resistance of Ab, Bc, Ac, and Cd.

Let $\frac{Ab+Bc+Ac}{2} = X$

Then,

A=X—Bc
B=X—Ac
C=X—Ab
D=Cd—C

If the measured series unbalances should exceed two ohms for side circuits, three ohms for phantom circuits, or five ohms for non-phantomed circuits, remedial measures should be undertaken. Consecutive tests to different points in the line will soon confine the fault to a very short section of the line where it can be readily found.

Insulation tests go hand-in-hand with the above, but a description of these tests would require treatment in another article.

Telephone Plant Conference Purdue University, March 20-21

The seventh annual telephone plant conference will be held at Purdue University, Lafayette, Ind., under the direction of the school of electrical engineering, engineering extension department, with the telephone association of Indiana, March 20th and 21st, 1929.

A two day education conference, devoted to a discussion of telephone problems, will be held. This meeting will be of especial interest to telephone plant owners, superintendents, managers and others responsible for the maintenance of telephone properties.

An unusual program has been arranged and can be had by writing J. W. Stafford, school of electrical engineering, Purdue University, Lafayette, Ind.

Acquires Phone Co.

Community Telephone Company has acquired a controlling interest in the Wisconsin Telephone & Telegraph Company, which is the exclusive telephone service of six Pennsylvania towns, announced by Vice President W. R. Matteson of Community Telephone. The new company will be merged into the Pennsylvania operating unit of Community Telephone as a part of its general policy of expansion. Subsidiaries of Community Telephone are now operating in six states.

Nebraska Holds Its Usual Good Annual Convention at Lincoln

Nebraska held its 30th annual convention at Lincoln February 14th, 15th and 16th, with an attendance of around 200, said to be the largest in a number of years. The annual banquet was attended by more than 300.

By resolution the association went on record as opposing the bill sponsored by the National Association of Electrical Manufacturers and backed by broadcasting companies that would create a monopoly in radio program use, unless changed so that the public would be protected only.

The president's address urged telephone companies to join and work through the association, as in this way a united front can be maintained, and the entire industry work together for the common good of all companies. Many other matters were touched upon by the president.

The secretary stated that both gains had been made and losses sustained during the year by the association, and that the end of the year found them gainer by one company.

Losses were sustained by consolidations, he said. Legislative matters pertaining to Nebraska were discussed by the secretary.

J. K. Johnson of Indianapolis, Ind., secretary of the Independent Pioneer Telephone Association of the United States, discussed the aims of that organization and invited those eligible to become members. Those who have worked in the industry for fifteen years are eligible.

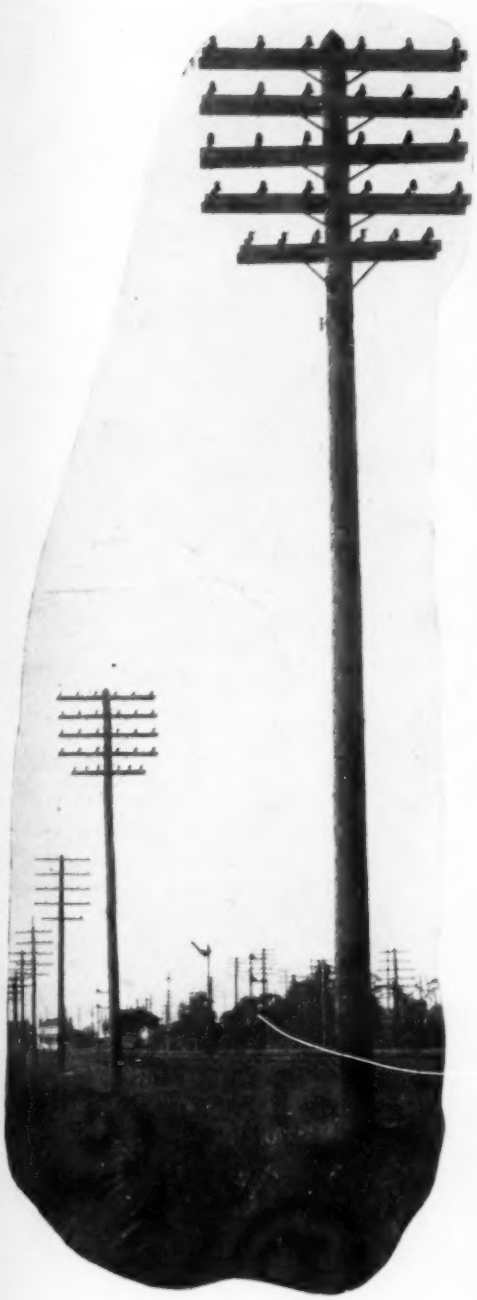
The following officers were elected for the year: C. L. Kelly, Farmers Telephone Co., North Bend, president; George E. Becker, Pawnee City, vice-president; George M. Kloidy, North Bend, re-elected secretary; W. E. Bell, Lincoln T. & T. Co., re-elected treasurer.

Enlarge Telephone Service

Athens, Ala.—An enlargement was made this past week to the Athens telephone exchange when a new unit was added to the switchboard which will take care of several hundred more telephones and provide adequate expansion room for the immediate future.

It costs you $147 to "save" $7 on a 40-foot pole

PRETTYMAN PRESERVED P29 FOREST PRODUCTS



THESE 40-foot Southern Yellow Pine Poles, (Class "B," A. T. & T. Co. Specifications No. 4429), impregnated with 12 pounds of Grade 1 creosote oil per cubic foot, cost about $14 each . . . $7 more than the same poles cost untreated. They will last 25 to 40 years; the untreated poles, 3 to 5. Granting each its maximum life, 8 untreated poles at $7 each would be required to equal the service of one creosoted pole. That would be $56. Seven replacements of the original untreated pole would cost about $15 each in labor alone, or $105. In 40 years, then, your untreated pole has cost $161. The creosoted pole has cost $14.

Prettyman Preserved Poles will put this difference into your pocket. Regardless of the type or size of untreated pole you are now using, there is a Prettyman Preserved Pole to replace it with a proportionate reduction of your pole costs . . . to stand faithfully in line and work for you 25 to 40 years . . . earning good will and increased profits through uninterrupted line service . . . saving for you the dollars that have been going back into your line to feed destructive termites (white ants), woodpeckers and decay-producing fungi.

Possibly you use a smaller, lighter pole than the 40-foot, Class "B" stick. Prettyman Preserved Poles cost anywhere from $3.50 for the sturdy little fellows to $40 for the giant 70-footers. All, however, will increase your profits in proportion to the investment you make. The case of the Class "B" 40-foot pole is representative. Write today for complete information . . . for prices on the sizes you use.

J. F. Prettyman & Sons
Wood Preserving Plant
Charleston, S. C.

Successful Methods in Line Testing

Shunt Method of Making Tests on Line as Used in Original "Stewart" Test Set—Description of Later Type Set Using Detector Coil Method—Its Advantages in Locating Line Trouble Efficiently—Features of Set and Its Operation

By CHRIS STEWART

Up to the time the "Stewart" test set was placed on the market, about all the repairmen could do when trouble was reported was to go out on the line and keep going until the trouble was located. This method, especially on long farm lines, proved to be a costly one. To overcome this condition, the "Stewart" test set was built.

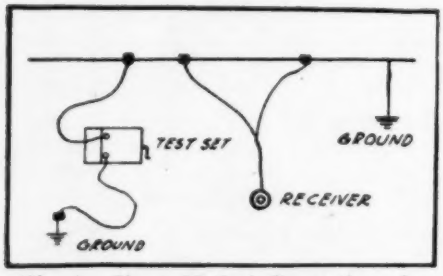


Fig. 1. Shunt Method Connections for Locating Crosses.

This test set tells which way and about how far the trouble is from the tester, without opening the line. Previous to the use of the "Stewart" test set, when a lineman made a test to determine the direction of the trouble, it was necessary to open one or both sides of the line and test in one direction and then the other. This method always left the line with more joints in it and also wasted the time necessary to open the line.

The original "Stewart" test set used what is known as the shunt method, while its latest set is equipped so that it locates trouble either by the shunt or detector coil method.

A study of Fig. 1 and the following explanation will no doubt make the shunt method clear to the reader. It will be noted that the current put out by the generator will pass out over the line through the fault and back over the other side of the line to the test set.

The receiver is unclipped from the test set and clipped to the wire as shown. Any time the receiver is shunted on a portion of the line between test set and the fault the generator crank turned, a tone can be heard in the receiver. In this way the direction to the fault can be determined and still leave the line intact as it was before.

Fig. 2 shows the connection for testing with the shunt method for ground. If the detector coil is used, it is placed on the ground wire with receiver attached, otherwise the connections are the same. The lamp connected in series with the generator would indicate the approximate distance to the trouble.

The detector coil method as shown in Fig. 3 is similar, with the exception of the coil. This detector coil is a small coil with a spring clip on one side which can be put on the wire by merely pushing.

It can be put on or pulled off with one hand and does not need to be in electrical contact with the wire. Therefore it can be used on insulated wire, rusty or corroded wire, without cutting the insulation or clearing off the rust or corrosion. It also can be used on heavy copper wire without any loss in the volume of the tone, due to the low resistance of the conductor.

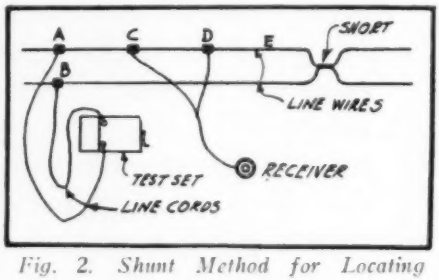


Fig. 2. Shunt Method for Locating Grounds.

It has terminals to which the receiver clips can be attached. These are spring clips and can be attached instantly with the use of the fingers only.

The coil picks up the tone and in this way the direction to trouble can be determined.

The use of the coil makes it possible to locate trouble on insulated wire without cutting into the insulation and where the wire is rusty or coated with corrosion, it is not necessary to scrape off this corrosion or rust to make contacts for the receiver. Inasmuch as the use of insulated wire is becoming more general, especially for drops, this feature is a time-saver.

This coil can also be used on inside wire or jumpers, either twisted or otherwise.

The advantages of a test set with these features are many. The lineman knows at all times which way the trouble is from him. He can go direct to the trouble without traveling over any branches of the line that are clear.

From a junction pole where the line runs two or more ways, the lineman can tell, from this pole without opening the line, which way to go for the trouble.

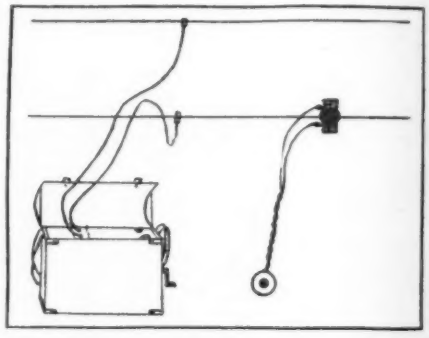


Fig. 3. Detector Coil Method of Trouble Testing.

In clearing a case of trouble as illustrated in Fig. 4, the lineman would proceed to A and test. Without opening the line, he could tell that the line between A and D was clear and then could go on to B. At B he could test again, and without opening the line, determine that the line from B to F and from B to E was clear.

Driving on to C, again without opening the line, he could tell the trouble was toward J. Traveling toward J, the trouble would be found at K.

By a study of the foregoing, it will be seen that the lineman is saved the time and travel necessary to cover the line from A to D, from B to F and B to E, from C to H and from C to I, or the time necessary to open the line at points A, B and C.

Where the trouble is hard to locate, such as jumpers burned short, crossed or grounded, or inside wire burned short, this type of test saves much time as well as lost circuit time. In addition to the features just mentioned this test set is a complete portable telephone. It is of light weight and very rugged to stand rough use along the pole lines.

Northern White Cedar Poles

Northern White Cedar Poles in lines of Chicago Telephone Co., on Wentworth Ave., south from 61st St. Set in 1899.

Far in the Lead!

THERE are more Northern White Cedar Poles in use in telephone lines than any other kind.

What greater proof could there be that Northern White Cedar poles are proving most efficient, satisfactory and economical?

The same happy combination of advantages that made Northern White Cedar the "original" pole timber is still the standard of comparison for all telephone poles.

Among those advantages are light weight, strength, good appearance, proper taper, and long life. At any time during the life of Northern White Cedar Poles, you can cut gains and install new cross arms without exposing poles to decay.

Northern White Cedar Association

Minneapolis - Minnesota

Time-Tested – Why Experiment?

It is equipped with complete cords and clips and full-length shoulder strap. There is a ring and hook in the shoulder strap so that the set can be brought instantly into the best operating position, allowing the free use of both hands.

The transmitter is mounted on an inside partition and the compartment that holds the receiver, cords and clips, when not in use serves as a mouthpiece.

A leather top buckles down over the top of the set to protect it from the weather, dust etc. The case is of oak, all joints held with screws and bound with brass, to further add to its strength. Fig. 5 shows a cut of the instrument.

A bulletin describing the test set will be furnished on request by Stewart Brothers, Ottawa, Ill.

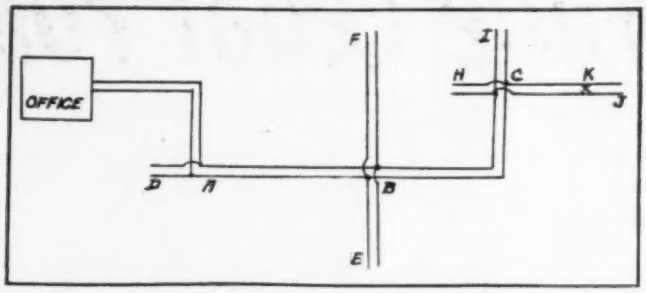


Fig. 4. Illustration of Use of Stewart Test Set in Telephone Line Trouble Location

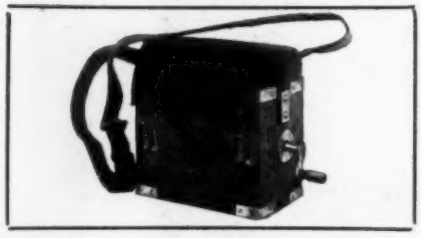


Fig. 5. The Stewart Test Set

A. T. & T. Asks to Lay Underground Line Across Gary

Gary, Ind.—Preparations for the building of a through east and west underground telephone line across the city of Gary were begun today when representatives of the American Telephone and Telegraph Company appeared before the board of works and petitioned for a franchise to construct this improvement.

The proposed new line is to be laid under ground in accordance with the program of the A. T. and T. Company for eliminating pole lines through cities wherever possible. A. T. and T. representatives said the proposed line will be used entirely for long distance telephone service. It will have a few connections with the local office but for the most part will be used as a part of the A. T. and T.'s transcontinental telephone service.

18-Story Telephone Building for San Antonio

San Antonio, Tex.—The Southwestern Bell Telephone Co., St. Louis, Mo., plans constructing a large central office building here, according to E. D. Nims, president. The structure, which will probably be 18 stories high, will be erected on a Martin street site, recently purchased by the telephone company. Automatic telephones are expected to be installed in this city within the next two years.

In a telephone conversation from the Pacific Coast to London, one talks nearly one-third the distance around the world.

The number of miles of wire making up the telephone system of Greater New York was recently figured out to amount to 7,835,500.

"THE STEWART" TEST SET

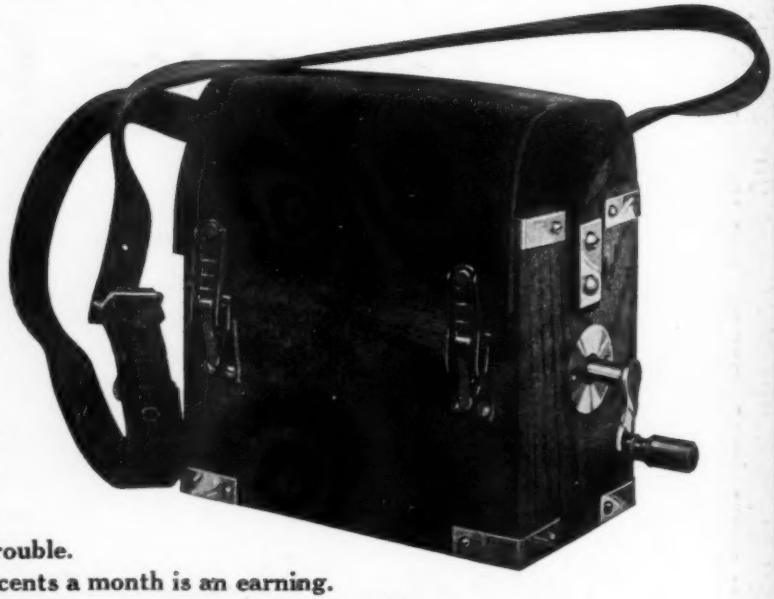
Now furnished with exploring coil is by far the best bargain ever offered in a Test Set.

Has more features than found in any other and at a lower cost. $32.00 f. o. b. Ottawa, complete ready for use. Why pay more for a Set not as good?

After consulting a large number of users of "STEWART" Test Sets we computed the cost of a "STEWART" Test Set over the period of its actual life and found the cost to be between 50 and 80 cents a month.

Think what this means. For 80 cents a month your lineman can be equipped the best.

The Test Set saves many times this cost in one day clearing storm trouble.



All that the Test Set saves over 80 cents a month is an earning.

One user wrote us that the one he had was worth its weight in gold.

What the Test Set did for him it will do for you.

SENT ON TRIAL.

Also Cable Testers, Detecto-Meters and Direct Reading Test Cabinets.

STEWART BROTHERS, Ottawa, Ill.

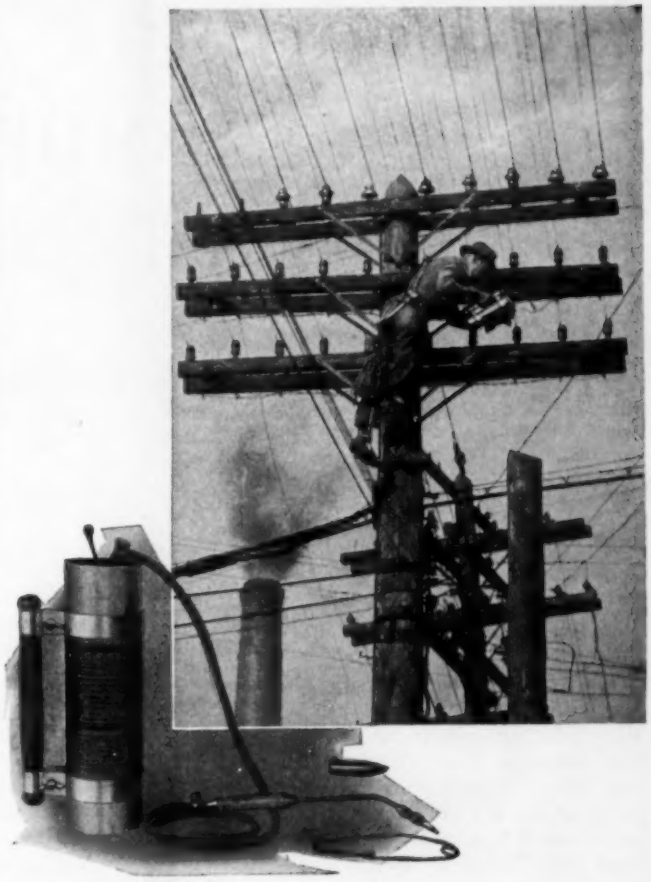
Crapo
Galvanized Products

Telephone and Telegraph Wire

Steel Strand

A sleet storm.... Miles of line down.... Wire stocks inadequate .... Rush shipments imperative.... Then look to Jobbers of *Crapo* Galvanized Wire and Strand.... You can depend upon them in every emergency.... and they, in turn, can depend upon us....for they know from experience that RUSH orders received by us in the morning are shipped before night....

Indiana Steel and Wire Company
Muncie, Indiana. U.S.A.



Prest-O-Lite is the QUICKEST way

WITH a Prest-O-Lite torch outfit linemen can do a faster, better splicing or brazing job every time. It's convenient and quick—nothing to get ready. Just turn on the gas, light the torch and the job is under way.

Utility companies everywhere are using Prest-O-Lite equipment for installation and repair work in the field and shop. There is a Prest-O-Lite torch for every utility requirement, furnishing a wide brush flame for soldering and heating or a small sharply defined flame for soldering delicate connections.

Ask the Prest-O-Lite Gas Distributor about this equipment or write us direct for complete information.

Prest-O-Lite Gas is available everywhere. Any one of 15,000 Prest-O-Lite Exchange Stations can supply you quickly with a full tank.

THE PREST-O-LITE CO., Inc.
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SAN FRANCISCO
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Prest-O-Lite GAS

Get EVER-PROTECT aid in your construction.

EVER-PROTECT has proved practical and profitable in making many hundreds of cable installations underground without a conduit. It protects cable against storm damage, corrosion, chemical action, electrolysis and abrasion.

In liquid form EVER-PROTECT is great for overhead work, protecting your cable and messengers against chemical action and other destructive influences.

Ask your nearest jobber for complete details.

EVER-PROTECT CABLE COMPOUND
TRADE MARK REG U.S PAT OFF

National Cable Compound Co.
Incorporated
MITCHELL - - IND.

Note Protection at Corners

Blake Insulated Staples
Trade Mark

Unequalled for telephone and bell wiring. The fiber insulation prevents troublesome short circuits and grounds. 4 sizes. Pat. Nov., 1900. Write for samples.

Blake Signal & Mfg. Co.
BOSTON, MASS.

By-Products of Telephone Companies

The Educational Training and Development of the Employee in Sales Activities

By F. V. NEWMAN

General Commercial Superintendent, Commonwealth Telephone Company, Madison, Wisconsin

The Educational Training and Development of the Employes in Sales Activities By F V Newman, General Commercial Superintendent Commonwealth Telephone Company, Madison, Wisconsin

The sales force of telephone companies have been greatly augmented by the training and development of the individual employe which has resulted in a substantial increase of revenue by the companies.

The step by step process of education began with the inauguration of welfare work which convinced the employe that the company's interest was not a selfish one, merely to obtain the required amount of labor for the salary paid, but which would result in mutual benefit—the principal object being to develop the initiative of the employe in order to become more interested in the company's dealings with its patrons.

Then followed the policy of better public relations, affording a better and closer contact of employes with customers. The privilege of attending group conferences, state and district conventions, reading of Telephony, house organs, monthly publications of telephone companies and participating in discussions of sales methods have awakened the employe's sales initiative.

The next step to sales activities was developed by the use of competitive campaigns for the sale of additional service, including extension telephone sets and by-products.

Interesting employes in the purchase of the company's securities and later in the sales of securities marked another step of progress in sales activity by employes. Often the unexpected employe won the prize for the largest amount of stock sold, while others were rewarded for the greatest number of shares sold to individuals, thereby creating a greater interest in customers' ownership.

With constant increase in operating maintenance, material and labor costs, the necessity for increased revenues has forced the development and sales of by-products in addition to the original form of revenue—subscribers' rental revenue.

One opportunity of increasing subscribers' revenue is by calling the subscriber's attention to the number of busy reports for his telephone and this is a practical sales talk which is convincing for additional service facilities.

Recording of names of individuals or firms who are not listed at "Information" gives the salesman another good prospect to work on.

Regrading the classes of service from a four to a two party line and from two party to individual line service are suggestions for more revenue.

Studies of plant department records often indicate that party lines do not have the required number of subscribers' telephones connected thereon and the subscriber is enjoying the use of an individual line at a four party rate. Regrouping of subscribers affords economy in the use of cable conductors and may establish the subscriber's desire for a different class of service to meet his requirements.

Reading newspapers and obtaining the list of new concerns to the city and a letter of welcome to them, plants the seed to subscribe for the indispensable and cheapest means of communication.

The convenience of an extension telephone which affords the subscriber a saving of steps and time should be emphasized by newspaper advertising, folders and "bill stuffers" mailed with subscribers' statements, suggestions printed on envelopes, etc. Selling extensions by use of the telephone has been productive and the temporary suspension of the installation charge has increased the volume of sales.

Selling campaigns by employes for additional revenues have caused the employes to take advantage of every sales point manifested in the daily routine of their respective duties and the keen rivalry for sales honors among employes has stimulated sales activity.

The hand set or cradle type has appealed to many as something different from the long used type of desk set. The additional revenue for this style, while not large, is well worth the sales effort.

Installations of private branch exchanges usually affords an excellent opportunity for an increase of revenue in the original installation and offers a medium for further increase due to the patron's future service requirements.

Wiring plans combining main lines, extension sets, keys and use of push buttons and buzzers especially in the medium size retail business and office affords a practical class of service that earns more revenue.

Two number, A. B. toll, C. L. R. methods and speeding up long distance service, improved transmission, station to station, evening and night rates, reduced long haul rates, key town sales plan, and sequence call list have popularized our long distance service.

Encouragement to increase percentage of completed calls, studies of cancelled and uncompleted long distance calls and other methods used in the traffic department all work towards the increase of toll revenue.

The promiscuous use of the telephone by the transient and non-subscriber in whom the subscriber has no direct interest has opened an avenue of increased revenue by the installation of a pay station and placing the subscriber's telephone in a more concealed location. The sharing with the subscriber a portion of the local receipts as his commission is often an inducement to securing his consent.

Directory costs should be turned into the revenue column by the sale of extra listings and advertising in the alphabetical and classified section of the directory. Grouping of nearby exchanges, listing subscribers' names in double columns and the use of smaller type reduces directory cost.

Many companies have used the directory as a by-product for a revenue producer, but some have in vogue low price schedules which need an upward revision.

Rental of underground ducts, cable pairs, pole contacts by municipalities for fire and police alarms are by-products from the revenue standpoint.

Radio broadcasting service has been introduced by telephone companies to make further use of facilities to increase revenue.

Growth in suburban developments has necessitated establishing local base rate areas with extra mileage charges for

*Delivered before the Wisconsin Telephone Association, February 21, 1929.

When sleet and high winds are threatening, protect your system with . . . . . .

"COPPERWELD" Twisted Pair Drop Wire

The long life drop wire

Copperweld Wire, a high strength wire made by molten-welding a thick layer of pure copper to a core of ductile steel, is covered with the finest quality rubber and cotton insulation. The steel core of Copperweld Wire gives strength to withstand sleet and wind loadings, while the copper prevents rusting and insures uninterrupted, clear speech transmission.

Data on Copperweld Insulated Drop Wire will be sent on request

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American Electric Company, Inc.
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Chicago, Ill.
Distributor to the Independent Telephone Trade

THIRTY YEARS' GROWTH *of* KESTER SOLDER

THE manufacture of KESTER SOLDER was begun thirty years ago, in the year 1899. No demand existed at that time for a self-fluxing solder because such a thing was practically unknown. But, with a true vision of its advantages over bar and solid wire solder, J. F. Kester began the production of self-fluxing solder, and, with his own firm faith justified by the product itself, he educated others to a recognition of its superiority. ¶ Year by year, with constant improvements in the manufacture of KESTER SOLDER, with sound merchandising policies and with consistent advertising, the growth of the use of this solder has been phenomenal. Each year has seen a widespread increase in the sales of KESTER SOLDER. ¶ An Engineering Department with a complete Laboratory is always ready to co-operate with anyone with soldering problems; its services are without charge.

CHICAGO SOLDER COMPANY
Established 1899
4201 WRIGHTWOOD AVENUE, CHICAGO

service rendered outside of the base rate area, which is usually the corporate limits.

The practice of serving rural subscribers at multi-party line rates, regardless of the length of the line, should be restricted, and rural base rate area of six miles with an excess mileage charge beyond base rate is being used.

A study based on operating costs has demonstrated that service or switching rates for subscribers' owned lines cannot be furnished profitably for less than a rental of 75 cents per month per subscriber with a minimum number of five subscribers to the line; where a lesser number are switched the minimum charge is collected.

The burden of free service to nearby exchanges is slowly being eliminated. However, marked progress in this endeavor has been made in the past, but there is plenty to do in the future.

Originating commissions paid by telegraph companies where there is no telegraph office in the village, plus the schedule toll rate for telephoning the telegram to the distant city where telegraph office is located, is another by-product from the revenue earning standpoint.

Revenues from by-products have assisted materially in maintaining a lower rate level to the advantage of patrons and the approval of regulatory bodies.

Santa Barbara Tel. Co. Net Profit Declined to $54,324

(From the Wall Street Journal Los (Angeles Bureau.)

Los Angeles.—Santa Barbara Co. reports for the year ended December 31, 1928, net profit of $54,324 after taxes, interest, depreciation, etc., comparing with $59,180 in 1927.

Statement for 1928 compares as follows:

	1928.	1927
Gross earnings.....	$529,074	$469,210
Net after taxes.....	201,888	184,000
Surp. aft. depr., int., etc.	54,324	59,180

Statement as of December 31, 1928, shows total assets of $2,266,782, comparing with $1,663,068 on December 31, 1927, while surplus amounted to $242,008, against $230,677.

The first radio telephone conversation from Atlanta to Hamburg, Germany, resulted in the sale of 400 bales of cotton.

Two Deserved Promotions in the Stromberg-Carlson Organization

Election of Edward A. Hanover and Ray H. Manson as vice-presidents of the Stromberg-Carlson Telephone Manufacturing Company took place at the annual meeting of the directors Thursday, February 28. The election of the two men as vice-presidents is in recognition of their service to the company and in keeping with the added responsibilities they have taken on because of rapidly expanding business.

Mr. Manson, who is regarded as one of the outstanding telephone and radio engineers in the country, now becomes vice-president in charge of engineering. He joined the Stromberg-Carlson Company in 1916 as chief engineer, and has been one of its directors since 1924.

Mr. Hanover, who is purchasing agent for the company, now becomes vice-president in charge of manufacturing. He has been with the Stromberg-Carlson company since 1902 and has been one of its directors since 1924.

In conjunction with the annual meeting, W. Roy McCanne, president and general manager, declares, "Orders have been secured at such a very gratifying rate since last July that 1929 gives every promise of being the best year in the company's history."

The annual meeting of stockholders of the company preceded the meeting of the directorate. Wesley M. Angle, Fred E. Goodwin, Edward A. Hanover, Thomas E. Lannin, W. Roy McCanne, Ray H. Manson, George A. Scoville, George W. Todd and J. Foster Warner were elected as directors. The directors then elected these officers: Chairman of the board, George W. Todd; president and general manager, W. Roy McCanne; vice-president and sales manager, George A. Scoville; vice-president and secretary, Wesley M. Angle; vice-presidents, Edward A. Hanover and Ray H. Manson; treasurer, George V. Lennon; assistant secretary and treasurer, Edwin C. Roworth, and auditor, Wilbur W. Hetzel. Director heads of the company are: Eugene E. Reinke, assistant sales manager; Ben Woodbury, special sales representative; Warren T. Eastwood, advertising manager; Edward G. Eidem, assistant chief engineer; Sidney E. Beyland, general superintendent; John T. McGuire, assistant superintendent; George A. Braddock, master mechanic, and Wm. R. Shall, chief inspector.

The company will begin to move into its new $1,500,000 plant next month, Mr. McCanne declared at the meetings. The removal to the new plant will take the larger part of three months, as it will be done gradually so as not to interrupt production.

Wisconsin Telephone Association Holds Business Convention at Madison, Feb. 20-21

President Walter Gallon of the Wisconsin Telephone Association believes in holding elections early if not often. At the morning session of the first day of meeting President Gallon appointed his committee on nominations and asked that they get together and report back at the same session. This was done and three directors were elected to succeed themselves. They were: J. E. Horsman, Rice Lake; W. F. Goodrich, La Crosse; and Walter J. Gallon, Antigo.

A meeting of the board of directors Thursday was held and the officers were re-elected as follows: Walter J. Gallon, Antigo, president; J. E. Horsman, Rice Lake, vice-president; W. L. Smith, Neillsville, secretary.

The heaviest snow of the season lay on the ground and the temperature took a nose dive the day previous to the opening of the convention and landed around 25 degrees below zero. Highways were almost impassable and accounted for the non-attendance of many who would have otherwise attended the session. However, a registration of over two hundred showed that much interest remains in the association.

President Gallon reviewed the work of the association and commented on the future of the industry, reviewing the changing conditions the last few years have brought about.

C. C. Deering, secretary of the United States Independent Telephone Association, of Des Moines, Iowa, attended the convention for the first time.

A banquet and dance furnished the social entertainment for the association.

"REBUILT" TELEPHONE APPARATUS and exchange equipment saves you 30 to 50 per cent without sacrificing quality or efficiency.
SWITCHBOARDS—Telephones—Apparatus—Protection Equipment—Cable—Everything you need for the installation and operation of a complete exchange—Magneto or Central Energy—of the best and most reputable manufacturers.
Fourteen years' successful operation of our rebuilt equipment department puts it past the experimental stage. Quality and price will make you a permanent customer. Better investigate.
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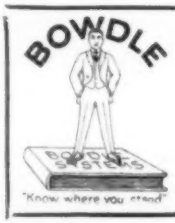

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This monthly Audit will save you lots of money and give you important information that you should have about your business—the best of all business, if properly managed.
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BATTERIES

With an Exide battery on the job, a long life of dependable, trouble-free service is assured. That is why Exides are so generally used by the telephone systems throughout the country.

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PHILADELPHIA
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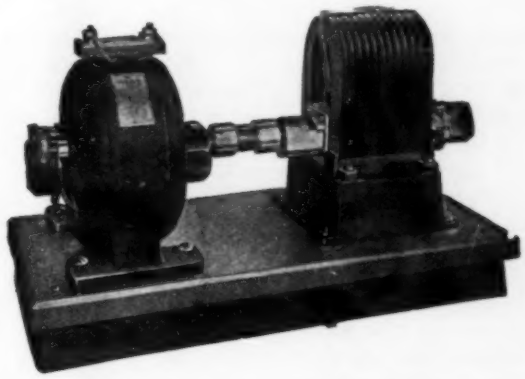

Maintaining an efficient, economical, carefree ringing service need not be a problem—but it does require good judgment in selecting your equipment.

Install Holtzer-Cabot Magneto Ringing Motor Generators. These units will enable you to dispense with battery maintenance and constant service diligence. Can be supplied for any voltage or special current.

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The greatest economy results when manufacturing responsibility for telephone conductors is undivided. When the wires, cables and cable accessories are all STANDARD products, responsibility for satisfactory service rests entirely with us. *Use our complete* STANDARD *line!*

Ask us for an estimate on your next installation.

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Unseen, *The Wood Crews Play Their Part*

THROUGH many miles of Southern Pine, over thousands of acres of Long-Bell timber, our Wood Crews go to find poles to meet your particular requirements, your individual needs. Logging selectively, cutting, trimming, peeling—they carry on with the skill of long experience, stimulated by pride in their product. From the very source of supply these important factors enter into the production of Long-Bell Poles, assuring the buyer the utmost in quality and value.

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Let this Trademark be your guide to pole purchases, your assurance of long and satisfactory service.

Long-Bell
CREOSOTED YELLOW PINE POLES

Summary of Annual Report of the A. T. & T. Co. for 1928

A year of eventful accomplishment for the American Telephone and Telegraph Company and its associated companies in the Bell System in improving telephone service while keeping down its cost to the user is described by President Walter S. Gifford in his report for 1928.

Other matters of general interest are discussed in the report, which shows that today's national and international service interconnects more than 27,800,000 telephones; the Company's reduction in long-distance rates and in the charges to its associated companies, in accordance with its policy; a growth in the number of its stockholders from 423,580 to 454,596; a noteworthy increase in the public's use of long-distance facilities; an expenditure during the year of $428,700,100 for construction; a forecast of more than $2,000,000,000 expenditure for telephone plant during the next five years; and the perfection of a transatlantic telephone cable.

The Company for 1928 shows net income for the year of $143,170,491.33 or $12.11 per share on the average number of shares outstanding during the year. The corresponding figures for 1927 were, net income, $128,614,910.12 or $11.76 per share.

In discussing the consolidated figures of the Bell System, the American Telephone and Telegraph Company and its associated companies, President Gifford's report said:

"The Bell System revenues from local exchange service increased $40,000,000 or 6.6 per cent over the previous year, and revenues from toll and long-distance service increased $38,000,000 or 14.1 per cent. The increase in total operating revenues was $80,700,000 or 9 per cent. Due in part to additional expenditures for better service, total expenses increased 8.8 per cent and the investment in plant and other assets increased 10.7 per cent. The total plant and other assets at the end of the year amounted to $3,827,000,000. The net earnings for the year of $242,700,000 were at the rate of 6.6 per cent on the cost of plant and other assets."

New Construction

"During the year $428,700,000—more than $1,000,000 a day—was expended on construction. While for the most part this was for facilities to take care of new business, a considerable portion of it was to provide better facilities to improve service. This expenditure for plant was the largest that has ever been made in one year.

"The expenditure for 1929 is expected to exceed this amount, and for the next five years will undoubtedly be well in excess of the $1,900,000,000 spent in the past five years.

"There were 798,592 telephones added to the number owned and operated by the Bell System, and at the end of the year 19,200,000 telephones in the United States were inter-connected in and with the Bell System. Approximately 4,300,000 of these were telephones of independent connecting companies—some 8,300 different telephone companies and 30,000 farmers' lines."

Rate Reductions

"Effective February 1, 1929, there was a reduction in toll and long-distance rates amounting to a saving to the users of about $5,000,000 annually. Also, during 1928 the basic transoceanic telephone rate was cut from $75 to $45. Effective at the beginning of 1929 the American Telephone and Telegraph Company reduced its charge to its associated companies under its contracts for services from 2 per cent to 1½ per cent of the gross telephone revenues of those companies. This reduction amounts to about $4,600,000 annually and is in accord with the practice of the American Telephone and Telegraph Company to do everything possible to aid its associated companies in keeping down the cost of telephone service.

With the exception of a few places where rates are clearly inadequate, and in spite of the tendency for the cost of furnishing local service to increase as the extent of the services increases, the continuing technical advances in the telephone art and improvements in operation methods should enable the system to provide ever increasing service in local areas without increase in rates. Through the increased number of telephones with which a subscriber may communicate and through improved service, the cost of telephone service is actually becoming less and less in that the telephone user is buying more and better service for the same money."

Long-Distance Service

"The most striking development in the telephone business in the United States during 1928 has been the increased use of the telephone for long-distance calls. While this use has been undoubtedly stimulated by general business activity and the rate reductions made in 1926 and 1927, the increased speed and improved quality of service have been the largest contributing factors.

The total number of messages handled over the long-distance lines of the American Telephone and Telegraph Company was 18 per cent in excess of those handled in the previous year. For the longer distances, such as between the Atlantic and Pacific coasts, the increase has been 100 per cent. The country is becoming 'long-distance minded' and is acquiring a new telephone habit.

"The volume of transatlantic telephone business continues to increase and has at times overloaded the radio-telephone facilities. A short-wave channel is now in use supplementing the long-wave channel.

Service Improvements

"During 1928 there was further definite improvement in local exchange telephone service. Operating errors, including those made by the users as well as those of the operating forces, were reduced 10 per cent.

"During the year 4,235,000 telephones were connected and 3,485,000 were disconnected. The elapsed time between application and installation or move was reduced 5 per cent. The companies aim ultimately to install or move all telephones by appointment on the dates requested by subscribers.

"These measurable improvements in service, as well as many others, in 1928, have been effected with due regard to every practical economy in operation."

Europe's Phone System Laid Chiefly in Cables

On Jan. 1, 1927, Europe had slightly more than 8,000,000 telephones, or 27½ per cent of the world's total. Long distance telephone wire mileage in Europe, says "New England Utility News," is largely cable, there being 15,150 miles of cable, containing 1,692,800 miles of two-wire circuits. The longest direct cable in operation in 1927 was between Berlin and London, a distance of 860 miles. The few gaps in the European long distance cable system at the present time, consisting of open wire lines, are rapidly being filled with cable, and eventually all international telephone traffic will be handled in land and submarine cable networks, which will insure high-grade and rapid communication between the nations of Europe.

VICTOR TELEPHONE CELLS

Uniform quality assures to you a lower average in replacement cost.

The Carbon Products Co.
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Cross Ringing Again On Your Harmonic Party Lines?

Your Pole Changer Needs Better Watching

If you had a HOLTZER-CABOT FREQUENCY METER to check its cycles, you could keep them so tuned that they would not get out of step.

THE HOLTZER-CABOT FREQUENCY METER is the best instrument for you because it RECORDS EVERY ALTERNATION.

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Because of the permanent record it gives, this meter is far ahead of any that depend upon reeds or electrical tuning devices. It is the most accurate Frequency Meter on the market today.

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THE SUPER FREQUENCY CHANGER

For All Telephone Ringing Purposes in Any Capacity from the Largest Central Office to a P.B.X.

Directly Converts 60 Cycle Lighting Current to 20 Cycle Ringing Current

WILL NOT DISTURB RADIO RECEPTION

due to radiation, but where Radio sets are connected to same power secondaries, install our special FILTER to prevent conductive interference.

Investigate economies of TELERING in P.B.X. use

FIRST COST IS PRACTICALLY THE ONLY COST
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Telephone Construction

Atlanta, Ga.—Southern Bell Telephone and Telegraph Co. plans erecting $5,500,000, 25-story building, Ivy St. and Auburn Ave.; 165x210-ft.; construction begins soon after Jan. 1, 1929, on first unit, 6-story, basement and sub-basement, to cost about $1,000,000; provide quarters for toll department; project ultimately house all company's departments, except district exchanges; Marye, Alger & Vinour, Archts., Walton Bldg.

Alva, Okla.—Southwestern Bell Telephone Co., B. D. Hull, Ch. Engr., Merchants Bldg., Dallas, Tex., soon begin laying underground cables in city.

Chickasha, Okla.—Southwestern Bell Telephone Co., St. Louis, Mo., receiving general contract bids for telephone building; 2-story and basement, 85x50 ft., brick and rein. conc., gravel roof; I. R. Timlin, Archt., 1010 Pine St., St. Louis, Mo.

Lamesa, Tex.—State Telephone Co. remodeling system; cost $60,000.

Hopewell, Va.—Petersburg Telephone Co. erect exchange, Cawson St.; Osbert L. Edward,, Supervising Archt., Elder Bldg., receiving bids; work to begin immediately.

Millport, Ala.—Public Service Comn. authorized Alabama Telephone Co. to acquire properties of Millport Telephone Co.

Mobile, Ala.—Scott Helt interested in organizing company to establish 5,000-watt, super-power radio broadcasting station; cost $110,000 with equipment; company to be capitalized at $125,000.

Covington, Ky.—L. B. Wilson erect 5,000-watt broadcasting station.

Mansfield, La.—Southern Bell Telephone and Telegraph Co., main office Atlanta, Ga., install battery or flashlight system to replace present cranking system; cost $90,000; install new set of switchboards and plant equipment, replace old wires; probably erect new exchange.

Baltimore, Md.—American Telephone & Telegraph Co., T. G. Miller, Gen. Mgr., 195 Broadway, New York City, reported, authorized construction program calling for expenditure of nearly $82,000,000 on new long-distance telephone facilities during 1929; expend $42,000,000 for extending and supplementing existing long-distance cable system; work in South includes cable route joining Boston and Washington; will continue cable line now connecting New York and Greensboro, N. C., as far as Greenville, S. C.; new cable lines will be completed linking Harrisburg, Pa., with Baltimore.

Edenton, N. C—Norfolk and Carolina Telephone-Telegraph Co., Elizabeth City, voted appropriation for additional long-distance toll line from here to Elizabeth City and on to Norfolk, Va.; begin construction immediately.

Statesville, N. C.—Harmony Telephone and Electric Light and Power Co., capital $100,000, incorporated; K. D. Cox, Asheboro; A. B. Pogue, Statesville.

Cedar Hill, Tex.—Carmichael Telephone Co., capital $50,000, incorporated; J. W. Carmichael.

La Porte, Tex.—Southwestern Bell Telephone Co., B. D. Hull, Ch. Engr., Merchants Bldg., Dallas, proposes to extend service to include Shore Acres, Sylvan Beach, Crescent Shores, Oak Hurst, Pine Bluff, Bayside Terrace, Bay Oaks and Seabrook; service to be in operation within 90 days; begun work on La Porte service.

Virginia — Chesapeake and Potomac Telephone Co. of Virginia, C. H. Weber, V.-Pres., Richmond, appropriated $341,890 for improvement to Virginia telephone systems.

Silver Anniversary of Wood-Preservers Observed at Louisville

More than 400 members and guests attended the twenty-fifth annual convention of the American Wood-Preservers' Association held at Louisville, Ky., Jan. 22-24, 1929. President H. R. Condon, in his address, commented on the growth and accomplishments of the association during the twenty-five years of its existence, reviewed progress of the past year, and stressed the value of committee work and proper selection of committee personnel as a guide to further progress.

The following officers were elected for the coming year: President, H. E. Horrocks, manager, Pacific Creosoting Company, Seattle, Wash.; first vice prisident, C. C. Cook, maintenance engineer, Baltimore & Ohio Railroad, Baltimore, Md.; second vice-president, J. S. Penney, vice-president, T. J. Moss Tie Company, St. Louis, Mo.; secretary-treasurer, H. L. Dawson, Chicago, Ill.

It was voted to hold the twenty-sixth annual meeting of the association in Seattle, Wash., in January, 1930.

Telephone Company Turns Over $924,445 to City

Chicago, Ill.—W. J. Boyd, treasurer of the Illinois Bell Telephone Company, recently turned over to City Controller George K. Schmidt the company's check for $924,455.11, representing 3 per cent of the gross receipts of all business done by the company during the six months' period ending Dec. 31, 1928. The payment is required by the company's franchise obtained from the city in 1907. Nogtiations for a new franchise are pending now before the council committee on gas, oil and electricity.

Georgia Telephone Association Elects Bowen as President

Atlanta, Ga.—Election of William R. Bowen, president of the Bowen Telephone Company, of Fitzgerald, as president of the Georgia Telephone Association, featured the closing session of the annual convention of the organization February 20 at the Ansley hotel.

Other new officers elected are: C. G. Beck, of Atlanta, Georgia manager of the Southern Bell Telephone and Telegraph Company, first vice-president; Walter Dakin, vice-president of the Southeast Telephone Company of Georgia, Montezuma, second vice-president; J. L. Mathews, president of the Statesboro Telephone Company, Statesboro, secretary and treasurer, and J. Prince Webster, of Atlanta, general counsel.

The following were elected to the board of directors: W. R. Bowen, J. L. Mathews, C. G. Beck, D. C. White, Atlanta; Walter Dakin and A. A. Fincher, of the Canton Telephone Company; J. M. Dent and J. W. Southall, of the Cairo Telephone Company, and J. L. Kirk, of the Consolidated Telephone Company, Moultrie.

Most of the addresses delivered at the convention had to do with the perfecting of telephone service. A number of the best known telephone men in the state, including representatives from most of the independent companies, attended the meeting.

Many Improvements Made in Earlsboro Exchange

Earlsboro, Okla.—Substantial improvements to the Earlsboro telephone system of the Standard Telephone & Telegraph Company have just been completed, according to W. O. Mills, division superintendent. One carload of creosoted poles was placed and 7,000 feet of wire strung at Earlsboro. The company also completely rewired more than 100 stations, making them fully metallic. The switchboard was also completely overhauled and the capacity of the main frame equipment was doubled. The entire system is now thoroughly modern and service has been substantially improved.

New Matthews Scrulix Anchors

An eleborate folder has been mailed out by the W. N. Matthews Corporation, 3720 Forest Park Blvd., St. Louis, Mo., describing their latest scrulix anchor, which they claim have several added features. Among other features claimed for this anchor described in this folder are: Greater holding power, less resistance when installing, which makes installation easier; the new wrench permits the men to stand upright at all times when making installation, and this speeds up work. You will doubtless want this folder. We suggest you write them at once.

Phone Improvements

Fort Dodge, Ia.—The Fort Dodge Telephone Company is arranging to spend about $35,000 in enlarging their present building at that place and installing new equipment, the necessary funds being voted at the annual meeting of the stockholders held on January 15th.

W. L. Lefean of Chicago, New President N. W. Cedar Association

Wilbur L. Lefean, president of the Naugle Pole & Tie Company of Chicago, was elected president of the Northern White Cedar Association at its annual convention held at Minneapolis in January.

Other officers and directors were elected as follows: John D. Twomey, Duluth, Minn., vice-president; H. F. Partridge, Minneapolis, Minn., treasurer; Norman E. Boucher, Minneapolis, Minn., secretary. Messrs. Partridge and Boucher succeed themselves as treasurer and secretary.

The board of directors are as follows: Don C. Bell, Minneapolis, Minn.; A. K. Berger, Cusson, Minn.; J. E. Gerich, Milwaukee, Wis.; L. A. Page, Minneapolis, Minn.

Additions to Sales Force of Jas. R. Kearney Corporation

James R. Kearney Corporation, St. Louis, Mo., announces the following additions to its sales organization:

Chas. P. Wenner, covering part of Ohio, Indiana, Pennsylvania and Michigan.

T. G. Carter, covering part of Tennessee, Arkansas, Mississippi and Louisiana.

Geo. R. Emerson, covering part of Maryland, Virginia and West Virginia.

M. Tipsord, demonstrating engineer of Kearney live line tools and accessories, located at St. Louis, Mo.

The Kearney Corporation manufacture equipment for the telephone trade. Their volume of business among the telephone interests are very rapidly increasing, they report.

Stromberg-Carlson Company Now Pays by Check

A change affecting employes and members of the Stromberg-Carlson Tel. Mfg. Co.'s organization went into effect the first of the year, when the concern discontinued the practice of paying wages and salaries in cash, in favor of bank checks of a new style.

"Advantages of the new system lie in its safety, convenience and time saved in getting out the weekly payroll," says George V. Lennon, treasurer of the company. "For years, in common with other concerns, we have made all remittances by check, with the single exception of salaries and wages. Now we have taken the ultimate step which does away entirely with the risk and uncertainty of handling large amounts of cash bulking as much as $45,000 on weekly paydays."

"Like the passing of the galloping fire horses, the discontinuance of the historic pay envelope relegates to limbo a certain colorful phase of industry, but one that was fraught with many anxious hours weekly," says Mr. Lennon.

"It was exciting, perhaps, for Paymaster Cowles and his armed guards to dash through Rochester's streets once a week, escorted by a motorcycle convoy of policemen, with the fortune in cash loaded onto a truck as a lure for payroll bandits. That such fears were not groundless is proved by the many successful attacks and the few cases in which the thugs are brought to justice."

The only hitch in making the change, according to Mr. Lennon, was the difficulty of signing some 1100 or more pay checks every week in time for the payoff. "Personally," says Mr. Lennon, "there is no task so tedious or wasteful of time for the executive as merely signing his name on hundreds or thousands of checks. Fortunately, our neighbors, the Todd Company, came to our rescue with their new electric check signer. This clever device signs my name better than I can do it myself, signs 1,100 checks in the time it would take me to put my "John Hancock" on a dozen or two, and all under my personal supervision and control so that positive safeguards against forgery and fraud are provided."

All Stromberg-Carlson checks are now written and signed on Todd electric machines, the checks themselves being the Todd "Greenbac" form which has the crisp "feel" and security of bank notes.

Reconstructed Equipment

Western Elec. No. 1333 Common battery steel hotel set with straight line or 16-33-50 or 66 cycle harmonic ringers equipped with Booster coil talking Ckt. @	$ 6.75
Kellogg No. 6B Cordless P. B. X. board with 7 local lamp lines and 2 trunk Ckts. @ $50.00—10-local and 3 trunk type @	65.00
Kellogg No. 97 or No. 118 Common battery desk set complete with No. 404 or No. 259 Steel signal sets, straight line or 16-33-50 and 66 cycle ringer	7.00
Kellogg or Dean drop coils, 100 ohm 35c ea. 500 ohm @	.50
Western Elec. No. 329 Transmitters with back & mouthpiece @	1.25
Western Elec. No. 250 or 229 Transmitters with back and Mouthpieces @	1.15
Western Elec. No. 143 Receivers with cords @	1.25
Gray 3-slot wall or desk type paystations @	5.75
Gray 5c single slot desk or wall type paystations @	1.25
Kellogg No. 30A combine line drops and jacks per strip of 10 @	12.50
Stromberg No. 986 C. B. desk set complete with No. 1132 Steel bell box with straight line or 16-33-50 or 16 cycle ringers @	6.75
Kellogg No. 34 2-M. F. Condensers @	.40
Western Elec. No. 20 desk set with W. E. Trans. & Rec. and new cabinet inside connection signal set 3-bar 1000 or 1600 ohm $10.00—4-bar $10.75—5-bar @	11.75
Kellogg No. 22 L. C. Transmitters with back and mouthpieces @	1.10

Write for Our Bulletin

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Literature?

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Book Review

The Lineman's Handbook, by Edwin Kurtz, McGraw Hill Book Co., New York.

This book is written expressly for linemen, foremen and other employees of line department of electric light and power companies. It is written in simple language and has a large number of illustrations showing how the various operations in line work are performed.

Throughout the book the requirements of the National Electric Safety Code are stressed.

While the book is written largely for electric power linemen, certain of the chapters will be of interest to telephone linemen and these chapters give a better understanding of the operations than any telephone handbook of general circulation. Especially informative is the chapter on pole line erection which in the main will apply to telephone as well as to power lines. The chapter on first aid talks and accident prevention would serve as excellent texts for home study or for informal first aid courses.

The book as a whole is a book of the type that could well be written to cover telephone line work. The absence of such a book has been referred to on many occasions. Perhaps some qualified telephone man will follow the example of the author of this book and produce a telephone lineman's handbook.

Installation Demonstration at Fort Wayne, Ind.

A demonstration of the actual installation of a subscriber's telephone equipment featured the regular monthly plant department meeting held January 25th at the warehouse and garage of the Home Telephone and Telegraph Company, at Clinton and Jacobs avenues. Harry E. Gray, general plant superintendent and chief engineer, presided at the meeting.

The demonstration of the installation of a subscriber's set was made on the auditorium stage. A cross-section of a house was built on the stage, together with all the pole and cable facilities ordinarily found near the average home. The demonstration included the conversation between the installers and Frank J. Baker, operating engineer, who took the part of the man of the house.

Under a running fire of questions the installers ran the drop wire from the terminal box on the pole outside the house and completed the installation of a new monophone or handset on the inside. Jimmy Sanders and Carl Detrick, of the installation department, took part in the demonstration.

WANTED

Wanted—Position with large telephone engineering or maintenance firm. Can assist on appraisals, plant inspections, maintenance, rebuilds and planning and constructing new systems.

Have had seven years' experience with independent and Bell companies. Have toll line and exchange construction and maintenance experience. One year traffic and two years' instrument and switchboard repair work with independent company.

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The Telephone Repair Shop
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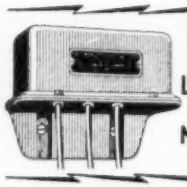
Chicago, Illinois



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Leich syncromonic ringers, 30-42-54-66 cycles, complete with gongs and nuts	1.25
Leich short compact type switch hook spring assemblies complete with hooks for side wall or shelf mounting	.35
Leich Elec. Co. oak bell boxes for C. B. sets with ringer and condenser and inside connections	2.00
Leich Elec. Co. compact magneto wall sets, enclosed binding post late type, 3-bar 1000 or 1600 ohm	9.00
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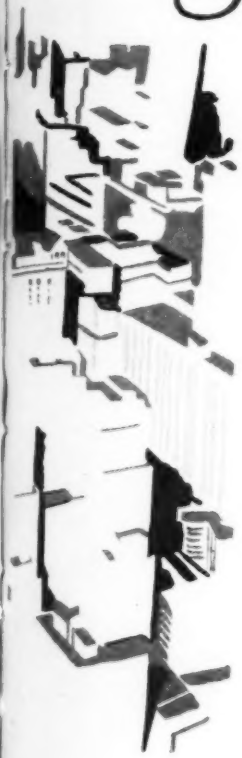


Big business, efficient itself, demands efficiency from others. The switchboard in the metropolitan district that serves the demands of big business and other rushing subscribers must possess speed and accuracy.

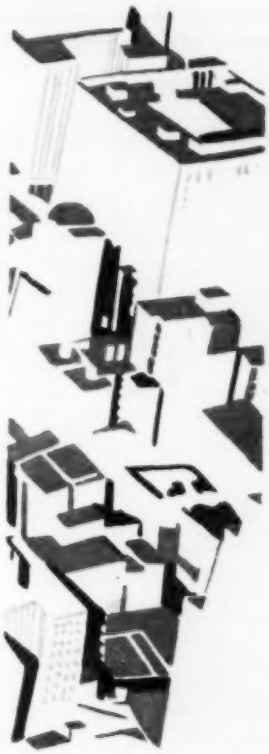
Stromberg-Carlson Super-Service Switchboards play their part in the rendering of such a service by relieving the operator of the maximum amount of mental and physical effort.

The greatest contributing factor to this is the simplified keyboard. Instead of the old style with sixty or more keys, there are only four or five which are common to all cord circuits. The operator is enabled to employ the touch system without the effort necessary to associate the correct cord and key.

The result is a reduction in the operating time, less fatigue, more accurate service on the part of the operator and pleased subscribers.

This is one of the features that make the Stromberg-Carlson Super-Service Switchboard the most economical and efficient telephone switching equipment on the market.

Write for Bulletin 117



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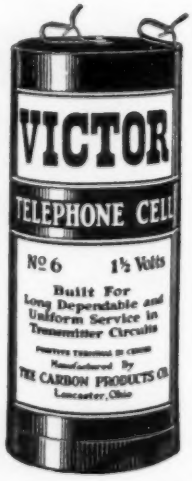

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